TUGAS AKHIR
LS 1336

SCHEME OF HULL CORRECTIVE MAINTENANCE MODULE FOR MANAGEMENT DECISION SUPPORT USING MICROSOFT VISUAL BASIC

By :

PEVI WAHYUDI
4201.100.028

MARINE ENGINEERING DEPARTMENT
MARINE TECHNOLOGY FACULTY
SEPULUH NOPEMBER INSTITUTE OF TECHNOLOGY
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2006

LEMBAR PENGESAHAN
TUGAS AKHIR

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TUGAS AKHIR
(LS 1336)

Diajukan Guna Memenuhi Sebagian Persyaratan

Untuk Memperoleh Gelar Sarjana Teknik

Pada

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Fakultas Teknologi Kelautan

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Surabaya, Januari 2006

Mengetahui / Menyetujui

Dosen Pembimbing I	Dosen Pembimbing II
Dr. Ketut Buda Artana, ST. MSc	**R.O. Saut Gurning, ST. MSc**
NIP. 132 125 668	**NIP. 132 133 980**

FAKULTAS TEKNOLOGI KELAUTAN - ITS
JURUSAN TEKNIK SISTEM PERKAPALAN
KAMPUS ITS KEPUTIH SUKOLILO SURABAYA 60111
TELP.5994754, 5994251 – 55 PES 1102 FAX 5994754

SURAT KEPUTUSAN
PENGERJAAN TUGAS AKHIR
(LS 1336)

Sebagai salah satu syarat untuk mendapatkan gelar Sarjana Teknik pada Jurusan Teknik Sistem Perkapalan, Fakultas Teknologi Kelautan ITS, maka perlu diterbitkan Surat Keputusan Pengerjaan Tugas Akhir yang memberikan tugas kepada mahasiswa tersebut dibawah untuk mengerjakan Tugas sesuai judul dan lingkup bahasan yang telah ditentukan.

Nama Mahasiswa	:	Pevi Wahyudi
Nrp.	:	4201 100 028
Dosen pembimbing	:	1. Dr. Ketut Buda Artana, ST, MSc 2. R.O. Saut Gurning, ST, MSc.
Tanggal Diberikan Tugas	:	
Tanggal Diselesaikan Tugas	:	
Judul Tugas Akhir	:	SCHEME OF HULL CORRECTIVE MAINTENANCE MODULE FOR MANAGEMENT DECISION SUPPORT USING MICROSOFT VISUAL BASIC.

Yang menerima tugas,

Dosen Pembimbing I	Dosen Pembimbing II	Mahasiswa
Dr.Ir. Ketut Buda Artana, MSc.	R.O. Saut Gurning, ST, MSc.	Pevi Wahyudi
Nip. 132 125 668	Nip. 132 133 980	Nrp. 4201 100 028

Surabaya, Januari 2005

Ketua Jurusan Teknik Sistem Perkapalan
Fakultas Teknologi Kelautan - ITS

Ir. Suryo Widodo Adji, MSc.
Nip. 131 879 390

ABSTRAK

Sistem perawatan korektif untuk lambung kapal harus dilaksanakan seefisien dan seefektif mungkin. Proses pemindahan data dan informasi dari kertas kerja satu ke yang lain menyita banyak waktu dan energi. Dalam pemindahan jumlah data yang besar, kemungkinan terjadinya kesalahan akibat faktor manusia menjadi lebih besar. Ketika pengolahan data untuk pengambilan keputusan menjadi rumit, hal ini perlu sebuah pendekatan yang sistematik untuk manajemen informasinya. Perusahaan pelayaran memerlukan suatu dukungan teknologi informasi yang cepat dat teliti untuk membantu analisa dalam pengambilan keputusan manajerial.

Solusi untuk jaminan kerapian dokumentasi perawatan kapal ialah dengan menggunakan komputerisasi sistem database perawatan lambung. Modul Perawatan Korektif untuk lambung kapal dapat membantu pengumpulan, penyimpanan, pembaharuan, pengolahan data perawatan lambung kapal dan prediksi perawatan. Dalam fungsinya untuk membantu keputusan manajerial, maka modul ini membantu memberikan penilaian kegagalan dari laporan kegagalan untuk menentukan tingkat kegagalan dan status perbaikan; cargo data memberikan informasi mengenai perkiraan pendapatan untuk setiap perjalanan; dan outsource data telah memberi informasi seperti *down time*, perkiraan biaya dan faktor ketersediaan. Itu semua, akan membantu pihak manajemen untuk memilih *outsource* yang terbaik, untuk aktivitas perawatan kapal. Dalam tugas akhir ini, penulis menggunakan *Microsoft Visual Basic* dan *Microsoft SQL Server* untuk membangun sistem database perawatan lambung kapal.

Oleh karena itu dengan implementasi dari perangkat lunak ini, memungkinkan penyimpanan dan pencarian data efisien dibanding dengan menggunakan banyak kertas kerja. Modul ini juga membantu akses data dari beberapa orang yang terlibat dalam perawatan lambung kapal..

Kata kunci: *Modul Perawatan Korektif untuk lambung, Database Perawatan, Keputusan Manajerial, Microsoft Visual Basic dan Microsoft SQL Server.*

ABSTRACT

Corrective Maintenance System for hull should be executed efficiently and effectively. Evacuation process of data and information in Fleet Division, from one worksheet to the other will confiscate of time and energy. In transferring amount of data, the human error probability becomes bigger than a few data. When the data processing for decision support was overwhelming, thus necessitating a systematic approach to information management. Shipping company requires an information technology support for quickly and accurately analysis in management decision making.

The solution for neatly maintenance documentation guarantee is using a computerize maintenance database system. The Hull Corrective Maintenance Module assists to corrective maintenance data collection, recording, storing, updating, processing and forecasting. At the function to assist the management decision, this module would give a failure assessment from failure report to determine whether the failure level and repair status; cargo data had given an information concerning the income estimation for every trip; and outsource data had given any information such as down time, cost estimation, and availability factor. That all, will assists the management personnel to choose the best outsource, which use for maintenance activity. In final project activities, the author using Microsoft Visual Basic and Microsoft SQL Server to construct the hull maintenance database system.

Therefore by implementation of this software, perhaps the depository and data seeking more efficient than using a lot of paper sheet. Hull Corrective Maintenance Module also assists the data access from many persons related in hull maintenance connection.

Keywords: *Hull Corrective Maintenance Module, Maintenance Database, Management Decision, Microsoft Visual Basic and Microsoft SQL Server.*

PREFACE

All of the honor, praise and glory belong to my Almighty God, for HIS strength, power, mercy, love and all that HE has done unto me until I could finished my final project. Actually, I am nothing without HIM. My final project has the following title:

SCHEME OF HULL CORRECTIVE MAINTENANCE FOR MANAGEMENT DECISION SUPPORT USING MICROSOFT VISUAL BASIC

This final project was arranged as a requirement of Bachelor Degree graduation in Marine Engineering Department, Marine Technology Faculty, Sepuluh Nopember Institute of Technology, Surabaya.

The author has realized this final project is a far way from perfection. Therefore, the author hope is a suggestion and development criticism will be given for this final project. For this opportunity, the author would give thank to every person that involved in finishing my final project.

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15. Other related person that I can't mention it one by one.

And at the end the author hope that this final project can give benefit, knowledge and information to everyone that read this final project.

Surabaya, January 2006

Author

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INTRODUCTION

CHAPTER I
INTRODUCTION

1.1 Background

Hull Maintenance System should been executed efficiently and effectively. Therefore, require the existence of adequate operational data system. Information technology support for the operation control data, be needed to make quickly and accurately analysis in management decision making for the shipping company.

The aim of ship maintenance is to assist the shipping company management can fulfilled the conditions of safety policy, environmental protection and regulations from international classification society. Shipping company is obliged to fulfill one of policy from IMO (International Maritime Organization) that is about released the ISM (International Safety Management) Code to take care commitment of management. Because this matter represent the condition to obtain DOC (Documents of Compliance) for the company and SMC (Safety Management Certificate) for the ship. Because of that, every data of maintenance have to be manageable efficiently and effectively for management report.

In actually, data traffics especially in armada division were solid enough. There are too many of manual work in inspection report analysis. Evacuation

process of data and information from one worksheet to the other will confiscate of time and energy. In transferring amount of data the human error probability becomes bigger than a few data.

Usage computerize system in keeping maintenance report, was also felt maximal less used, it is caused by registered in different various program. With insufficient tool, a Fleet Manager will obtain difficulties in determining decision as quickly and precisely for repair status. And existence about tradition of concerning ships maintenance, that only pursuant to decision maker experience (Fleet Manager), so when commutation of Fleet Manager will be happened, processed the experience transfer wouldn't maximal. Therefore, need a good management of change. Every decision taken for ship maintenance not only influences the ship operational, but also has truly impact for the earnings of shipping company.

The solution to guarantee the neat maintenance documentation is using software, which can update the every step from process of ship maintenance with the newest data. Where Hull Maintenance Management is representing an innovative solution for the inspection arrangement and ship repair strategies. The focus from Hull Maintenance Management is integrity of hull life cycle owned to cover the inspection strategies and periodical maintenance. When detailed inspections have been already done, the inspection result required follow up step by shipping company management.

The Fleet Manager needed a tool, which can assist in conducting its duty as a person who has a responsibility in execution monitoring of ships

maintenance. Using Hull Corrective Maintenance Module for Management Decision Support which its function is make some assessment from non conformities report to determine whether the damage represented Minor Work or Major Work requiring furthermore action and finally to determine the repaired status. Processing the scheme development paradigm Management Decision Support Software is a group of duty, phase and efficient activity to transform of user requirement to an effective software solution. In represented the activities that happened during the inspection report assessment uses the Microsoft Visual Basic.

Fleet Portal contains the accurate historical data, the transport route, the result of previous inspection, the method and explanation about the previous maintenance and its material. From this information, is expected to assist analyzing condition the Sister Ships (the ships which seen to be own the looking like of hull form), have the corrosion damages at different place. With the existence of accurate information support from inspection report, a Fleet Manager from will be easier to assess the assorted cause of damage or non-conformities which was founded in field.

The inspection reports will be analyzed to assess the risk so that could take a decision with concerning maintenance precisely. To analyze the non-conformities report use the FMEA method (Failure Modes and Effect Analysis), so that plan to determine the model and the effect from the damages. Pursuant the analysis, a continuation decision from the inspection reports can be made to decide whether ship can continue its operation but with

the existence of periodical inspection, or bring the ship for the docking repair. However the software purchasing expense make expenditure expense will be increase, so that installment factor is competent become the special consideration for shipping company management.

1.2 Problem Formulation

The problem of scheme the Corrective Maintenance Module:

1. How to determine the risk priority number, from an inspection report with this module.
2. How to determine down time period, with historical maintenance data.
3. How to know the relationship between the dock space availability with the repaired status.
4. What is the impact of Corrective Maintenance Module for hull maintenance application, in the making of good management report concerning the reasonable repair.

Problem definition used in solving of this final duty is:

1. Failure report as an input for Failure Assessment.
2. In scheme of Corrective Maintenance Module do not assess the compatible hardware.

1.3 Writing Purpose

In this final project will take some purpose. Intention of study process to be done for:

1. Knowing the way of software scheme by Microsoft Visual Basic for maritime application.
2. Knowing parameter for the managerial decision making of ship repair status
3. Knowing the way of analyzing, non-conformities inspection reports for hull damages.

1.4 The Benefit of Final Project Result

From result of scheme Corrective Maintenance Module obtained the following benefit:

1. With the existence of software scheme use the Microsoft Visual Basic be expected able to depress the expenditure especially for the expense of purchasing and software installment.
2. Give an input to shipping companies, upon the consideration concerning hull maintenance software.

CHAPTER II

THEORETICAL BASED

CHAPTER II
THEORETICAL BASED

2.1 General

By operating ship, go out to sea to cause the great enough damage potency for hull construction. Work scope to hull cover the body / ship construction / ship husk especially part of below or under load line is inclusive of sea chest. The example damage is: rustiness, gluing of plant and animal go out to sea the, cart, rips the, leakage, deformation, displacement or possible moment of making or repair does not pursuant to going into effect (Sasongko, 1996).

2.2 Hull Construction Failure

Displacement and erosion also result the leakage happening. While because accident factor will enable to the happening of following at husk or construction log or possible also cart. The happening of cart, rip, even leakage to plate of hull construction oblige to change newly as according to guide and classification rule. Dint (dented) and also wave (corrugation) at plate of construction husk can be depicted at Shell Expansion and have to be changed by pursuant to classification (Sasongko, 1996).

According to Sasongko (1996) the happening of rustiness at hull construction will result:

- Decreasing of hull construction generally

- Taking place of rustiness process will result the happening of leakage of plate of husk of ship construction.
- Decreasing of it thick seta leakage oblige to change and repair.
- This repair cost money which do not minimize also will add the cost allocation for the treatment of ship repair and,
- Repair will confiscate the time operate for the ship result the ship earnings will also decrease.

According to Sasongko (1996) inspection at hull construction cover the:

- Thick measurement of husk plate and also precisely on course.
- Location inspection and also wide measurement and deepness of deformation of plate of construction husk.
- Inspection to rustiness condition, paint abraded and leakage routinely

2.3 Hull Maintenance Software

To increase monitor ability for every fleet by inspection optimize, usable hull treatment management hence software of Hull Maintenance. Advantage which can be obtained with the software application for example: existence of accessing to always to know the condition nowadays hull with the election of management report can improve the observation process the inspection and execution of structure treatment become militant from hull of ship. The available of transparent information and easy to understand for management party to overall of armada owned. (www.dnvsoftware.com).

Software of this Hull Maintenance is designed for the : optimize of the reporting database, analysing hull condition, assisting organization of management function better with the existence of adequate data support and structure govern the job and also the specification of from treatment. This system is consisted of the system at ship and office (liner), what organically database transfer by update database (www.dnvsoftware.com).

2.4 Database Management System

And Database Management System represent a group of program to define, to making / storing and database manipulation to assorted of application. Its intention Data manipulation looks for the data (query), data modification (update) and makes the report (Pramana, 2000).

While software of Hull Corrective Maintenance for Management Decision Support representing the part of Hull Maintenance Management, has target to be can study the damage reported by an inspection moment to evaluate the status of ship and its continuation action. Risk enumeration require to be taken to be facilitating risk arrangement remember the existence of order - obligatory order this time. Monitoring consistently to be done lessen the fatal impact of function failure (www.dnvsoftware.com). To get the failure function with the risk study can be taken by using Failure Modes and Effects Analysis (FMEA). Influencing failure can also that moment from installation early hull or repair moment (Keyserling, 2000). By FMEA obtainable analyze the risk quantitatively and also

qualitative which also to get the level of damage risk that happened at the time of inspection (Keyserling, 2000).

In scheme of software of Management Decision Support use the Microsoft Visual Basic applicative for this time, because most job world still use the Microsoft Windows (Holzner, 1998). Basic very easy to write the program base on the Windows. Environmental of Visual Basic programming contain all medium required to develop the program for the Windows of swiftly and efficient. Existence of line of menu and toolbar give the amenity to access to all command controlling this program. (Halvorson, 2002)

According to Pramana (2000) in designing software there are some activities, covering:

1. Requirements Analysis and specification

   Understand will conducted by that moment system (fundamental problems) and express in the form of clear and detail.

2. System And software design

   Determining correct solution for the fundamental of above problems and express [it] in an easy form to be translated to a computer program.

3. Implementation / coding

   Translating designed by software to a programming language.

4. Testing

   Checking software so that as according to requirement wanted and free from the mistake (error / bug).

5. Operation And maintenance

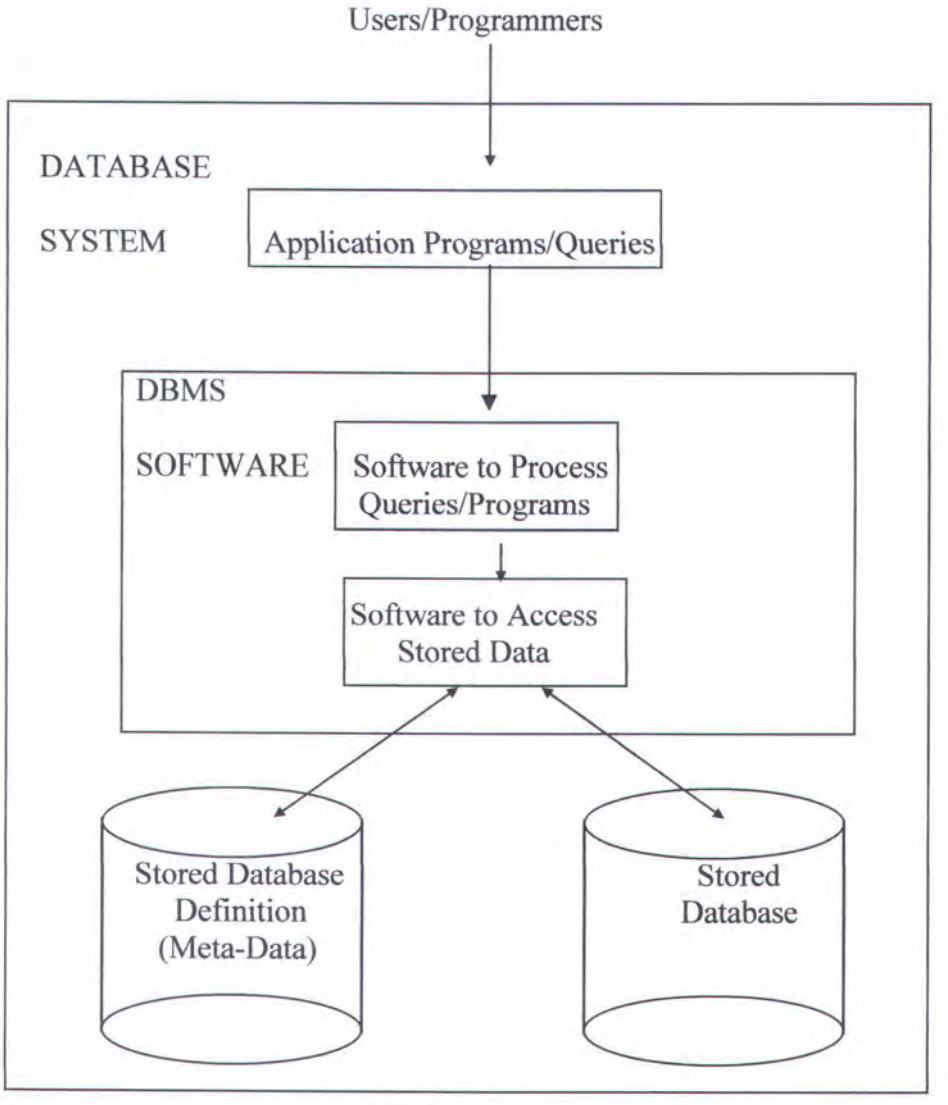
   Repairing any mistake [is] which emerge and improve the facility from system as according to requirement

The data model gets its inputs from the planning and analysis stage. Here the modeler, along with analysts, collects information about the requirements of the database by reviewing existing documentation and interviewing end-users.

The data model has two outputs. The first is an entity-relationship diagram, which represents the data structures in a pictorial form. Because the diagram is easily learned, it is valuable tool to communicate the model to the end-user. The second component is a data document. A document that describes in details the data objects, relationships, and rules required by the database. The dictionary provides the detail required by the database developer to construct the physical database. Database design is defined as: "design the logical and physical structure of one or more databases to accommodate the information needs of the users in an organization for a defined set of applications".

Database System

A database system is compilation between database and software for manipulate database.



Picture 2.1 Simplify Database System Environment.

The design process roughly follows five steps:

1. Planning and analysis
2. Conceptual design
3. Logical design

4. Physical design
5. Implementation

The data model is one part of the conceptual design process. The other, typically is the functional model. The data model focuses on what data should be stored in the database while the functional model deals with how the data is processed. To put this in the context of the relational database, the data model is used to design the relational tables. The functional model is used to design the queries which will access and perform operations on those tables.

2.5 Entity Relationship Modeling

Modeling Data / Data Analysis is technique to comprehend a problems and its complexity as well as to get the information required to solve problem the by seeing the problems from the aspect of look into the DATA

Some technique of modeling data:

1. Entity Relationship Modeling

   Is first time introduced by Chen P. (1976). Most Model data often used in design of database application conceptually, with the focus of data which will be kept.

2. Semantic of Modeling Object

   Using concept of class and subclass in modeling data

3. The NIAM (Nijssen Information Analysis Method)

   Model this pursuant to description data truthfully. This is conceptual data model owning complete notation for the represented of data.

4. Binary of Modeling Data

   Is a data model to orient the graph, where its dots (nodes) is an attribute atomic (simple) and its lines (binary arcs) represented relationship type between two attribute

5. Object-Oriented Modeling

   Technique modeling which is pursuant to concept orienting at object (object-oriented) and suited for application using language and database orienting at object.

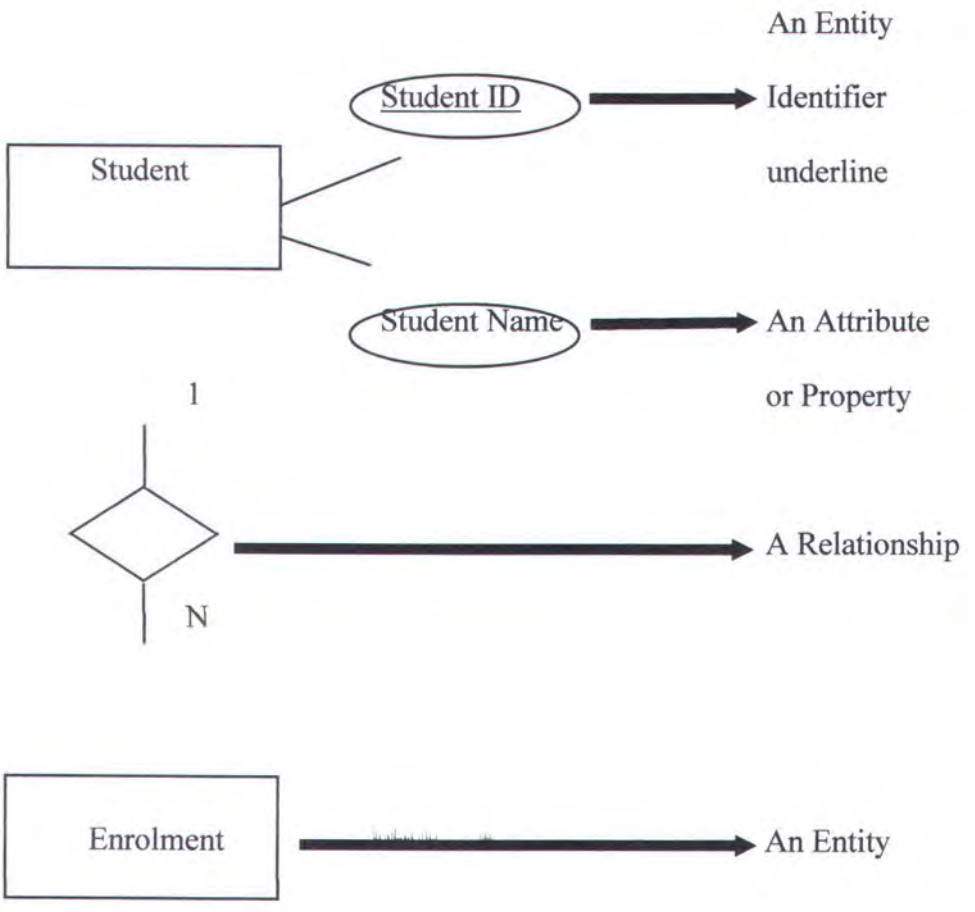
   From all kinds of the data modeling technique, ER Modeling is the most popular during last 2 decades, though latterly start to emerge the other, which can represented of more amount information that is Semantic of Object of Modeling and Object-Oriented Modeling.

What there is ordinary system represented in the form of element (entity) from problems, its characteristic (attribute) and relation/link (relationship) usher the elements.

Phase E.R. Modelling

1. Learning input
2. Design the conceptual model in mind
3. Representation Model by using diagram which hence notation of ER modeling.

Notation



Picture 2.2: Main component in ER Modeling.

Entity

Complex Entity enough to be defined so that cannot be got by an acceptable and satisfying definition by all party. In general, entity is something in the world of reality owning separate existence. A entity can in the form of an object owning physical existence (human being, car, house, or officer), or in the form of an object owning conceptual existence (company, work or majors from an university)

Follow the example of the entity:

- student, lecturer, class, study area (in university modeling)
- officer, manager, departmental (in white collars modeling)

Entity Instances:

- Kindness is instance from entity student
- S1 Sistem Perkapalan is instance from entity of study area

Weak Entity is entity, which its existence hinges full at existence from other entity. For example, husband / wife from officer are weak entity which its existence base on the entity officer.

Attribute

Attribute is property from entity in the form of information about the entity. For example, entity officer own the following attribute:

- Name
- Address
- Gender
- NIP (Number of Officer Mains)

Follow the example of the attribute above is ordinary attribute. Others, there are some other type attribute, that is Composite Attribute, that is attribute which is formed by merger of some other attributes. For example: attribute address, coming from merger attribute walked the, town and zip code.

Multi-value Attribute, that is attribute owning some value (nilai) to every instance from entity. For example: title (Ir, drs, SH ...), somebody can own

some title at one blow

Identifier (key) special attribute which by unique can be used to identify a An instance from entity. For example:

- NIP [is] key for the entity of officer
- NRP [is] key for the entity of student

Relationship

Relationship used to connect two entity or more with the certain meaning. For example incoming Kindness Student [of] majors of area of study of S1 Sistem Perkapalan Officer Tono put hand to the company X Degree (derajat) from relationship is amount entity participating in the relationship. This Degree can in the form of unary (one entity), binary (two entities, three entities) ... Relationship Binary, which is most commonly, used the Cardinality from relationship used to identify the structure from relationship. For example:

- One To one (1:1)
- One To many (1:N)
- Many To many (N:M

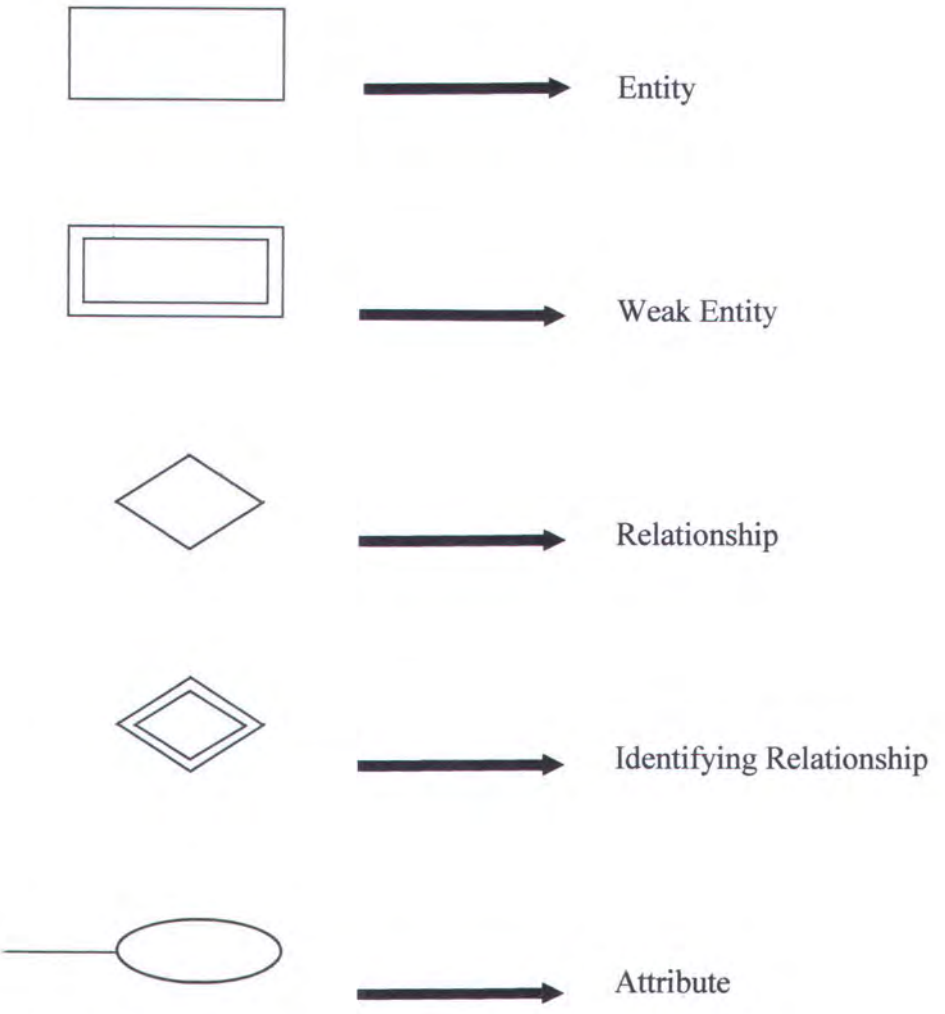
Advantage of ER Modeling

1. Simple
2. Able to represented core from what required making a good design database.

Loss of ER Modeling

1. Its result can in the form of some alternative model, depended how all analyst / designer comprehend the system.
2. Notation from ER modeling still a lot of variation (less standard).

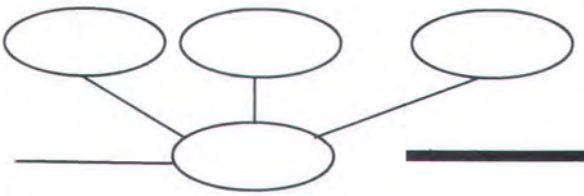
Summary ER Modelling Notation



Key Attribute

Multi valued Attribute

.....



Composite Attribute

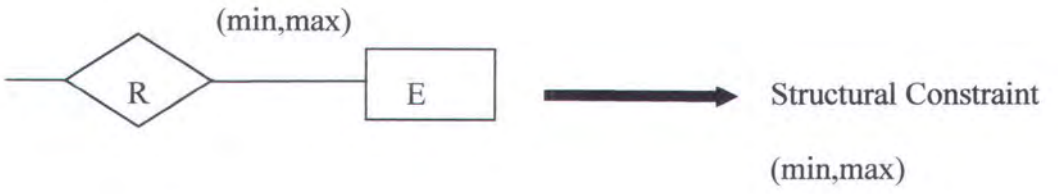
Derived Attribute

Total Participation

of E2 in R

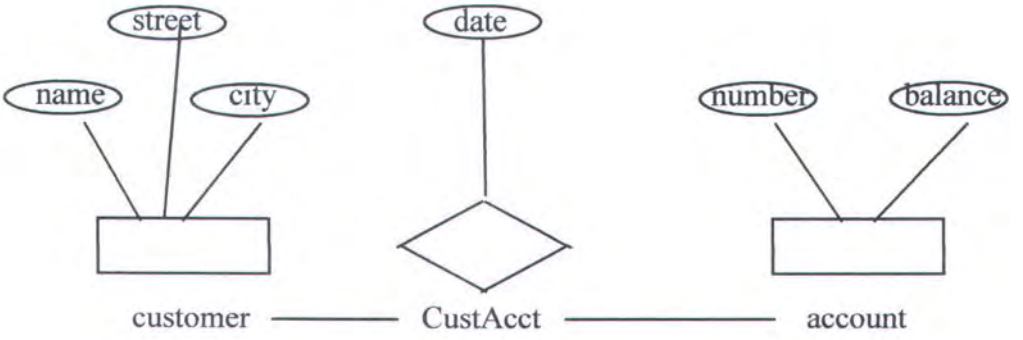
Cardinality Ratio

1:N for E1:E2 in R

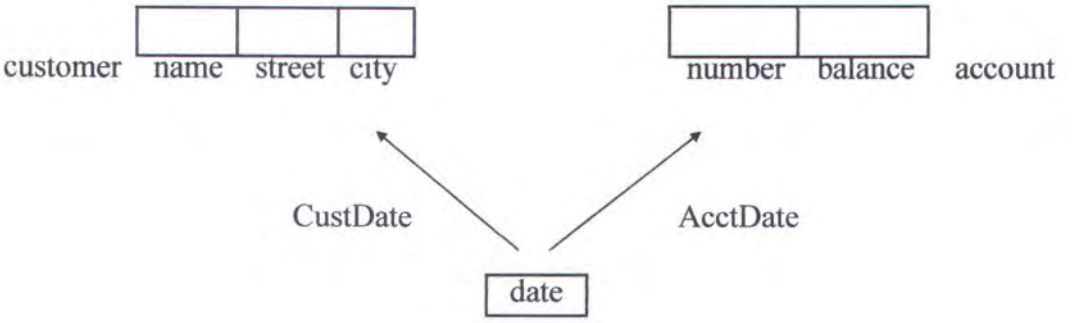


Picture 2.3 Summary ER Modeling Notation

ER diagram:



Data-structure diagram:



Picture 2.4 Example of ER Modeling

2.6 Microsoft Visual Basic 6.0

Visual Basic is one of computer language programming. Language programming is a command that understood by the computer to do certain duties. Visual Basic language programming that developed by Microsoft since year 1991, representing development from its predecessor that is BASIC (Beginners All-Purpose Symbolic Instruction Code) language programming that developed at 1950. Visual Basic is one kind of Development Tool that use to make assorted of computer program, especially a computer program that used Windows operating system. Visual Basic represent a language programming that supporting object (Object Oriented Programming = OOP). In object Oriented Programming (OOP). Window Form of Visual Basic has the character of the UI (User Interface), which we can develop by using a peripheral control of toolbox.

Program that based on Windows have the character of event-driven, it's mean program that work based to the event that happened to the object in the program. For example, if a user clicking a knob hence program will give the "reaction" to the event click. The "reaction" that gives by Program will match according to the code program (algorithm) that made for event at certain object. Algorithm from this program will we develop according to ER diagram which we have made previously, and the table form will we make as easy as possible for the user that will used this program later.

2.7 Computerize Maintenance Management System (CMMS)

The objective of maintenance organization is to maximize uptime in most cost effective manner. To accomplish this objective, the following strategies must be clearly specified:

1. Effective maintenance strategies derived from equipment condition and history.
2. Effective techniques for planning and scheduling of work order and utilization of resources.
3. Monitoring of maintenance activities, data collection and performance reporting to support continuous improvement.

These three activities require information about equipment, worker, work orders, jobs, job standards, production schedule and the nature of operations organization. The amount of information that is collected processed and use for decision making is overwhelming, thus necessitating a systematic approach to information management. In, addition, the complexity and uncertainties involved the process of maintenance, engineering and the amount of information handled in a typical maintenance system require computer support. Appropriate computer support provides the means for quick and timely response.

A computerized maintenance management system (CMMS) is basically an information system adapted to serve maintenance. A CMMS aids in process of data collection, recording, storing, updating, processing, communicating and forecasting. The CMMS is an integrated system that helps the maintenance

leadership manages all aspect of life in the department. It is essential for planning, scheduling and controlling the maintenance activities. Through effective reporting, a CMMS can provide maintenance managers and engineers with the information needed for sound decision making to control and improve the maintenance process.

Most organization today has some sort of computerized maintenance support but may have failed the reap the full benefits of CMMS for the following reason:

1. In many cases, the system doesn't meet the maintenance requirements.
2. The system not user friendly.
3. Maintenance planners and engineers are well not trained in using CMMS.
4. CMMS reports are not used for maintenance improvement.

The success of a CMMS can be measured by its availability to support the maintenance process. Two important elements are essential for an effective CMMS:

- Its ability to support the main activities in the maintenance process and,
- The ability the software and hardware configuration of terms of its reliability ease of use, quality of information and timely processing.

CMMS can be centralized in small organizations or completely decentralized and distributed in large organization. It can run on main frame, micro computers, workstations and personal computers. In addition, it can be a standalone system or part of a network in a client – server environment. A typical local area network may have several remotely located terminals. The

software can be menu driven or window based. A typical CMMS is linked to inventory, payroll, purchasing and accounting. Experience has shown that the system reliability, timeliness and ease of use enhance the utilization of a CMMS and increase its benefits to the organization.

In terms of support to the maintenance process a CMMS usually includes the following functions:

- Equipment identification
- Preventive maintenance
- Work order management
- Planning and scheduling
- Inventory control
- Job standards
- Equipment history
- Costs and budgets
- Performance reports
- Quality reports

In the design process of a CMMS one or more of preceding functions are usually grouped into one module. A CMMS design that supports the previous function is presented, for the example this is work order or request control module serve the following functions:

1. Documenting the process of work request and authorizing the work to be performed.
2. Planning, monitoring and controlling the actual work.

3. Collecting data about maintenance performance and costs.

4. Providing needed information for feedback and continuous improvements.

The work order requires two types of information. The first type is used for planning and scheduling and the second is for identification.

This module initializes the work order by supplying the necessary information regarding new jobs. The categories of information are as follows:

- Work order number
- Date
- Problem definition and tool needed
- Equipment number, work plan and location.
- Estimated man-hours and costs.
- Worker and Material

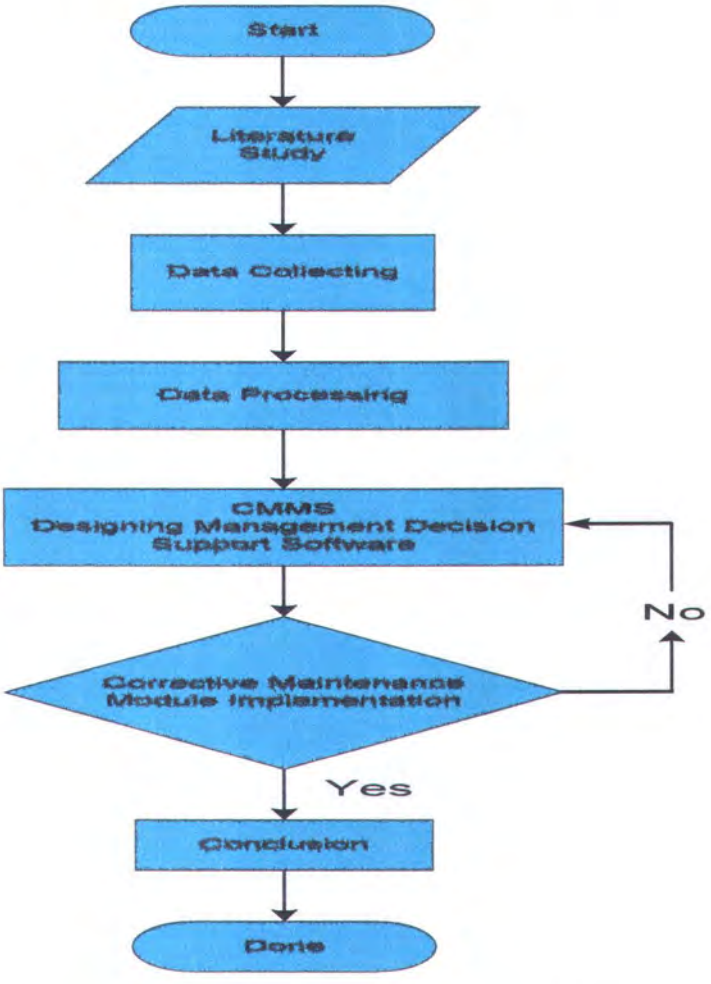
CHAPTER III

METHODOLOGY

CHAPTER III
METHODOLOGY

3.1 General

To solve the problems of this final project that have been analyzed, Methodologies represent a base framework that used as a reference. To finish this final project hence will be used a simulation method, so that all data changes can be documented better and clearer picture to analysis from the data than manual work. Step from this method shall be revealed as follows:



Picture 3.1 Methodology of the research flow chart

The explanation from flowchart above as follows:

3.2 Study of Literature

At this phase will be complete to literature, which there have with reference to maintenance ship (maintenance management process), method study the damage modes and effects (with FMEA) also technique study to design software by using Microsoft Visual Basic.

3.3 Data Collecting

Data collecting is a first step to learning about actually condition happen in real fields, so we must build a bridge to take a connection between actually condition and maintenance theories. The most important knows about maintenance of ship activities in Meratus Shipping Company. Data that we need in Software Process Development Paradigm, to develop Management Decision Support for the example as follows:

Business Process of Maintenance activities, Consideration to determine the repair ship status, Shipping Routes, Cargo data, Historical of repair and ship inspection data, Non Conformities Form, Planned Maintenance System record and others.

The method for data collecting from the Fleet Division of Meratus Shipping Company is:

1. Making conversation with the Meratus employees, who involved in Maintenance activities.

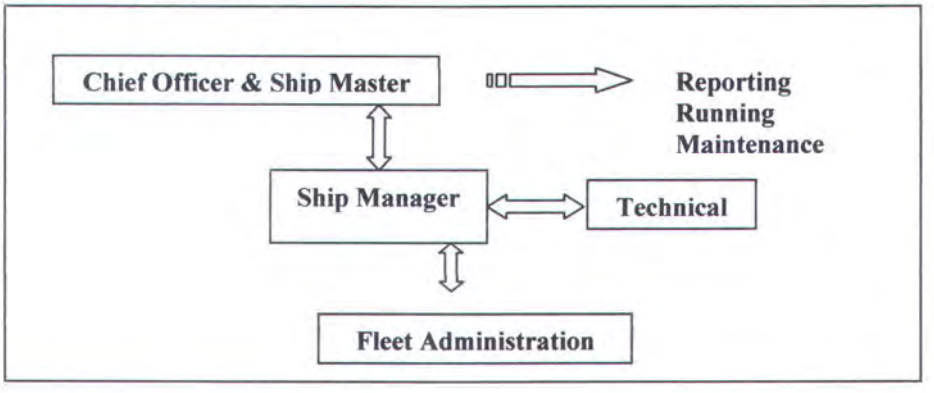
2. Taking some document and example data record from Meratus Shipping Company.

3.4 Data Processing

Data obtained learned, and then grouped and compiled such as those, which planned facilitate the input determination, location, process the program and output. Especially is determining the business process of maintenance activities in Meratus Shipping Company as a fixed form.

Business Process of Maintenance activities at Meratus Shipping Company, for the example as follows:

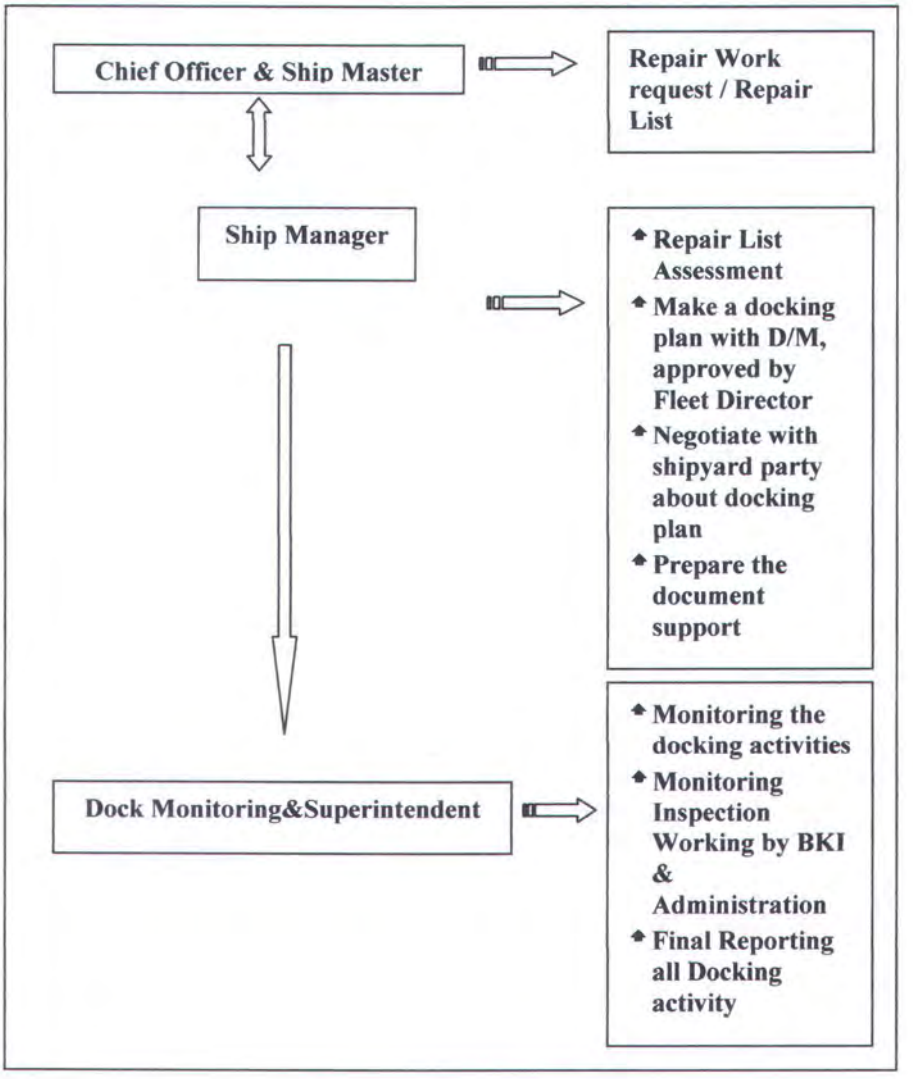
a) Running Maintenance



Picture 3.2 Running Maintenance Workflow

Running maintenance is a maintenance activity according to Planned Maintenance Schedule. Routinely crew activity, which Chief Officer has a responsibilities to record every activity.

b) Docking Repair



Picture 3.3 Docking Repair Workflow

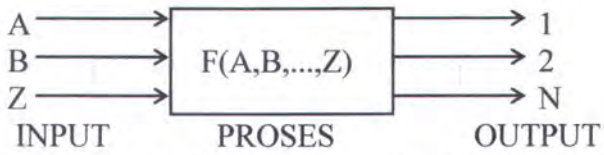
3.5 Hull Corrective Maintenance Module Designing

1. Important have requirements analysis and specification, because with understand what thing be done by that moment system (problems fundamental) and express it into clear and detail form.

   Systems analysis is some steps, which must be done in order to

identifying, understanding and planning to solve a problem, and at the same time, out for allocation some of planned solution in the software forms. Making specification from a problem (problem specification) usually complicated enough, because used public software system to increase a work system, where previously there is no system at all (or there is, but very finite). It is usually, difficult for an organization to anticipate the effect of change.

System modeling is an art to interpret and get the relevant detail from problems fundamental. One of way of to make the model from a problem is with focusing at staying process in the system. Process is a transformation (change), transaction or event owning certain input and yield the certain output by way of processing the input



Picture 3.4 Transformation Process

2. System and software design

Determining correct solution for the fundamental of above problems and express, it in an easy form is translated to a computer program. Process designed is representing the continuation from systems analysis process. Design is early stage from development phase of a product or system. Design stage can be defined as:

Applying process of various technique and principal to define a device, detail process or system so that can be realized in physical.

Intention of designer is to yield the model or representation from an entity to be developed later. Then processes from the model development represent result of combination from intuition and experience from designer, which have developed the similar system. There are two public questions about process designed by this:

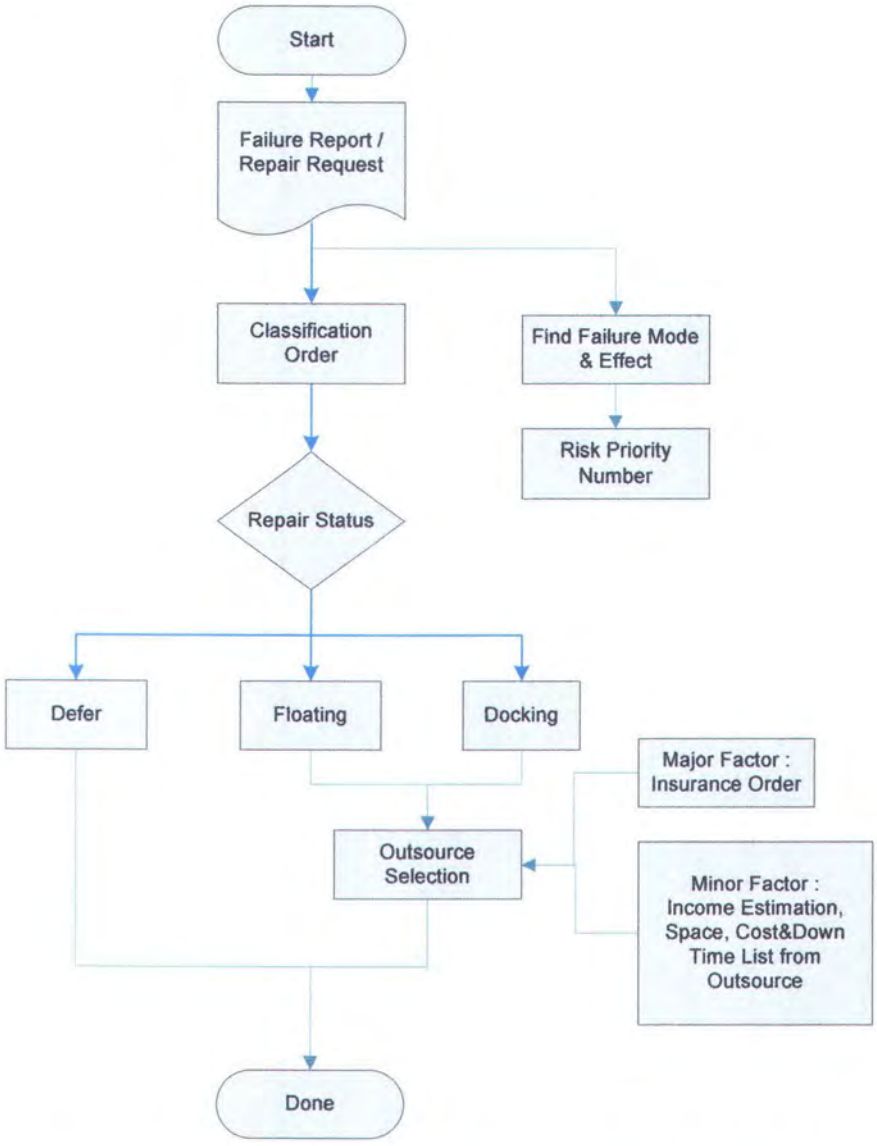
- How to evaluate a designed by a system?
- How to control a process designed?

In this phase, quality from data structure, the architecture program, interface and detail from procedure/function developed and repaired continuously, analysed and documented. Design stage yields a software representation, which can be used to assess the quality from software. Principles designed of this, are used by all software engineer during the process designed to take place the concepts designed to provide the criterion basis for assess the quality from designed

Modularity in program and also data and abstract concept enable all designer to moderate and return the reuse of software component. Program and data structure are especial component from software architecture, while detail procedure prepare for the algorithm implementation. Information Hiding and functional independence provide the heuristics to reach the effective modularity. Software designed process must be done carefully, may not in a hurry. Quality of the result from software very depended from this design stage.

3.6 Mechanism Process of Decision Making

The mechanism process of decision making to determine the repair status for the ship constructively software of Hull Corrective Maintenance for Management Decision Support is like flowchart as follows:



Picture 3.5 Mechanism Process of Decision Making Flowchart

Explanation from flowchart above shall be as follows:

1. Failure Report

   Failure report from visual inspection result represents the input to be analyzed to determine the continuation action. Chief Officer has responsibilities to record every maintenance activities including failure report from visual inspection by vessel crew. Therefore, every failure report should be reported to Fleet Division to get the continuous action.

2. Failure Mode & Effect

   Important to find the failure mode & effect, because we can estimate every risk from every failures happened. With FMEA method, we obtain the severity, occurrence and risk priority number. In addition, the aim is making documentation the failure, which can be consideration for maintenance system in the future.

3. Classification Order

   Classification must check the failure and have the right to give some advises or orders about the repair execution. The order concerning about marine safety requirement. Classification has a related connection with the ship certificate, so the obligation of shipping company is fulfill every order from classification.

4. Repair Status

   Constitute the beginning step before ship manager or superintendent order the repair execution. The repair status depend on classification order, absolutely its have a directly connection with the hull failure condition. The repair status will be dividing in three terms: Docking repair, Floating repair and Defer or delay.

5. Insurance Order

   Every vessel in shipping company had an insurance agreement with insurance company, to guarantee every operational duty. Concerning about repair activity, usually every insurance company will make reference to the certain dockyard become its belief. And shipping company has a right to choose every dockyard which it only has been chosen by insurance company.

6. Income Estimation, Space, Cost & Down time List from Outsource

   This income estimation comes from earnings to the transportation of container from each Port. Such space here is the availability dock space of exist in dockyard to conduct the repair activity. The Cost & Down time list from Outsource will be received by shipping company after they offered the repair order to outsource party.

7. Outsource Selection

   To choose the best outsource must consider the insurance order as a major factor. The repair cost will be paid by insurance company

according to the polish assurance, if only the hull failure including in insurance agreement. As a minor factor, the income estimation is worthy to get attention, because after choose any repair place from insurance reference, the shipping company wouldn't sacrifice the hug income to choose the repair place. Also with the cost & down time work that be offered by subcontractor & dockyard, availability space for the vessel must support the repair execution. That being compared with the other outsource repair list, to obtain the minimum cost & down time. All of repair execution plan, especially involving the outsource party (dockyard & subcontractor), should been approved by Fleet Director such as his responsibilities in Fleet Division.

3.7 Software Implementation

Implementation or coding phase is translation process from design stage to Programming Language. Coding is often considered to be focus from system development phase, where ought to exactly only some of minimizing from overall of phase.

Reliability in program can be reached by avoiding fault and apply the conducive facility fault-tolerance of operational system remain to though happened the fault which can result the system failure. Some programming technique like command GOTO, pointer and floating-point very easy result

the error. The technique above as possible avoided the use of Facility of data type for the modeling of 'real world' very assistive avoid the software faults, because program will be more easy to be comprehended and information will be more be covert. Error in programming will be more seldom is happened. Software can be referred as fault-tolerant if the software still able to be executed though there are fault, which can result the system failure. There are four aspects from program fault-tolerance, that is failure detection, damage assessment, fault recovery and fault repair.

Testing is process execute a program as a mean to find the error. Testing be used to check whether/what result from program developed have as according to result expected

What good technique testing for?

- Test the good case is test case owning big possibility to find the mistake which not yet been known.
- The testing can give the information such as which mentioned above.

What referred with the successful test?

- Successful testing is testing which can find the previous error unknown.
- Testing cannot indicate that a program free from the error, but only can show the existence error in a program.

Software testing represents one of profession discipline to justify the result product. Becoming the intention of the existence of this testing is finding the

existence of Bug / Error, where software do not work such as those which expected. Finding Bug early possible to anticipate the finding Bug here in after. The finding of a Bug represent the indication of is existence of other Bug. Ascertaining every mistake that happened has been repaired the method used for testing:

- Dynamic Black-Box Testing to test the data process.
- Dynamic White-Box Testing to correct Bug.

3.8 Frame the Conclusion

Moreover, with this phase the conclusion is made, of course about the assessment this software and the opportunity to develop this software in other time. Absolutely, the final project result (software implementation) need to have discusses with related Shipping Company. It's important, because the suggestion from Shipping Company will become an especially requirement to construct this software in the future.

CHAPTER IV

SCHEME OF SOFTWARE

CHAPTER IV

SCHEME OF SOFTWARE

4.1 General

Process the software development (Software Process / Development Paradigm) is a group of phase, duty and activity required to by efficient transform of user requirement to an effective software solution. The aim Software Process Modeling is to represent of the activity that happened during software making and its changes (evolution). The models use background is requirement to yield a real correct system early possible in its development process. Especial reason is expensive. Progressively early a mistake can be detected in system development, repair expense it progressively lower.

A good process model and structure of determining phase sequence in a creating transition criterion process to go forward to phase hereinafter. Requirement and characteristic from software system from application type differ highly varied, so that there is no a model process or paradigm which can include, or cover all type of system development software.

4. 2 Model of Software Scheme

Model the Waterfall

Model this Waterfall is also recognized by the name classic model. Because this is a model which is at most recognized and used.

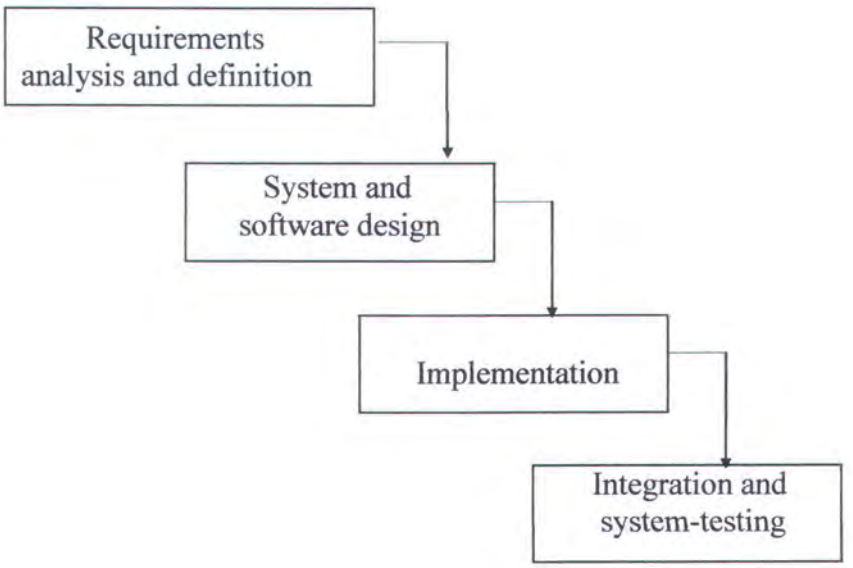


Figure 4.1: Model waterfall

The advantage of this structure is every phase own the method to yield a document which can be delivered to user and document yielded every phase can get the specification clearly and detail

First, when we concern to requirement analysis and definition, object of this project should be specified. In this final project we used the Meratus Shipping Company Ltd. as a model object. Therefore, require the existence of adequate operational data system. Information technology support for the operation control data, be needed to make quickly and accurately analysis in management decision making for the shipping company. As representing one

of company which big sharing in business in the world of Indonesia maritime, with the professional worker, making Meratus as liner which have mount the natty and good company management, so that can be made by one of example for the liner of other specially in Surabaya and East Indonesia Area.

This company mount non-stopped till in 1987 having 11 ships and 1990 mounting again become 15 ships. Meratus representing first Indonesia Company serving special is transportation of interfiled container in Indonesia. Nowadays this Company have 29 ship counted in 2005. But unfortunately, Matos didn't have hull maintenance computerize database system. The computerize database system is helpful for maintenance data arrangement.

4.3 The Scope of Hull Maintenance System

Hull maintenance system can be dividing into some maintenance area. We should define the maintenance area of Meratus Shipping Company, especially in Fleet Division.

The Maintenance Area of Meratus Shipping Company is:

1. Planning and Scheduling

   The Schedule of Planned Maintenance System being determine by a team work (Ship Manager, Superintendent & Dock Monitoring).

2. Preventive Maintenance

   Maintenance working for prevents the failure function with preventive maintenance planned

3. Corrective Maintenance

   Be determined in 2 conditions, between planned and unplanned maintenance. The aim is to repair and improve a facility condition until fulfill the requirement condition.

4. Emergency Maintenance

   Can be included to the unplanned maintenance because the repair action must do as soon as possible.

5. Continuous Improvement

   An improvement phase to analyze all maintenance reporting. The aim is making a decision for the fleet division concerning maintenance system more efficient and effective.

4.4 The Business Process of Corrective Maintenance

In the beginning, we must know the workflow of maintenance information from Meratus Shipping Company, especially in Fleet Division:

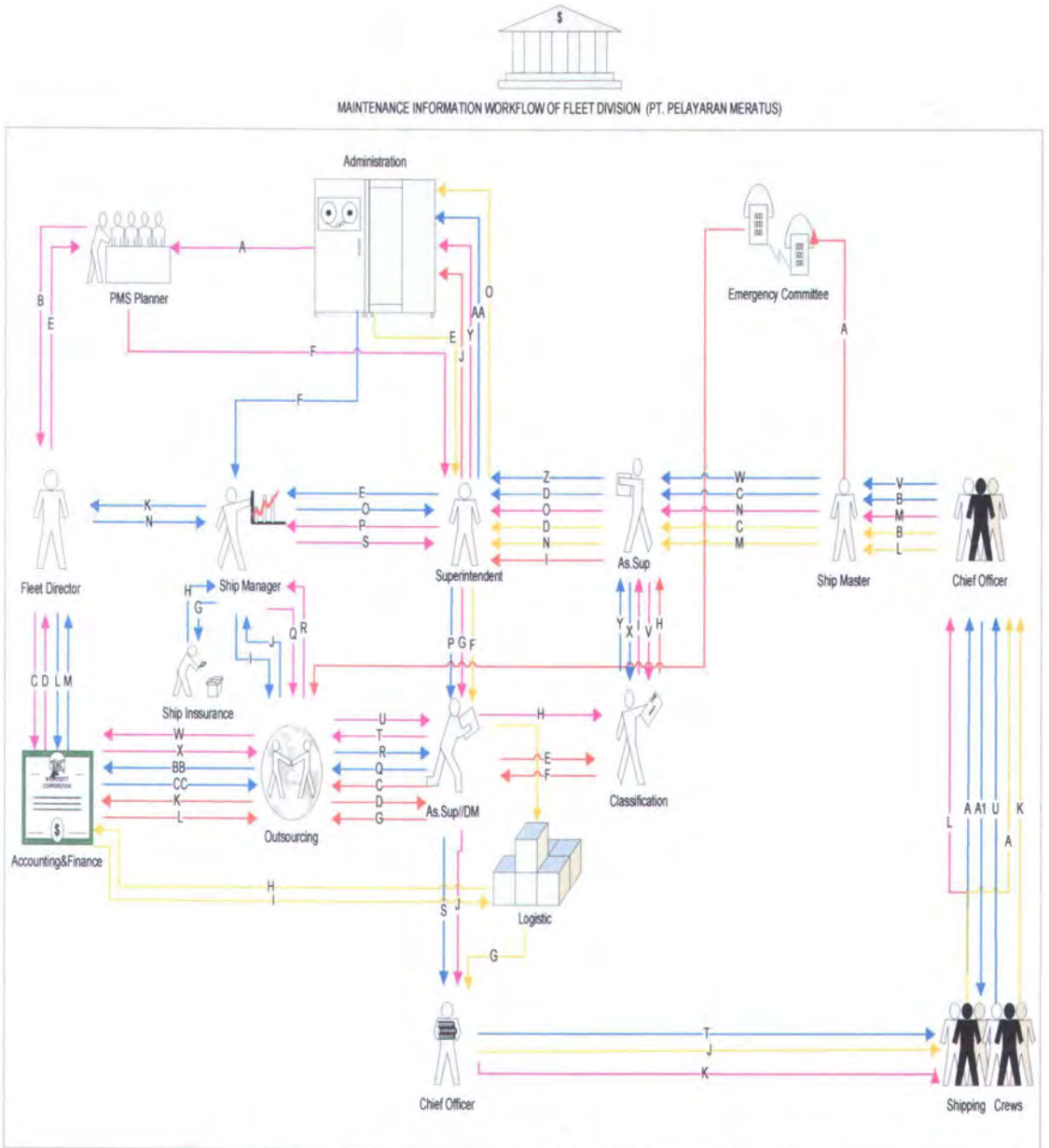


Figure 4.2: Maintenance Information Workflow

For the example, the repair and material request workflow will be explained below:

1. Repair request

A. The crew make the repairing proposal to the *Chief Officer*

B. *Chief Officer* make a report of repairing proposal with fulfil the minutes on the failure reports

C. The report of repairing proposal which have been agreed by *Ship Master* will be delivered to the *Assistant Superintendent*

D. The report of repairing proposal will be delivered to the superintendent that commissioned to monitor the ship maintenance activity

E. *Superintendent* deliver the report of repairing proposal to the Ship Manager to be analyzed of its repairing status

F. Ship manager require the data input from the fleet administration to analyze the ship repairing status

G. Ship manager will check the agreement data with the insurance company

H. The insurance company will give the agreement data by Meratus officer

I. When the occurring damage will influence the agreement with the insurance company and need the outsourcing company. Hence, the ship manager will contact the outsourcing company in the agreement

J. The outsourcing company will offer the repairing plan to the ship manager

K. The offering result from outsourcing company must get an agreement from the head of Armada Division

L. Head of Armada Division ask the report from accounting and finance division for allocated budged that planned for overall ship maintenance

M. The detail report of ship maintenance from accounting and finance division

N. Repairing plan that have agreed head of division will be delivered to the ship manager

O. Repairing plan that have agreed by ship manager will be delivered to the superintendent

P. Repairing plan that have agreed by the superintendent will be delivered by assistance of superintendent

Q. *Assistant Superintendent* makes coordination with outsourcing company. Conduct the observation and control to all docking activity based on dock plan to fulfill the goals in its specified time schedule

R. Check all activity that conducted by Shipyard Company or contractor on the satisfaction notes. Monitor the docking report as following :

   i. Docking report

   ii. Drawing of skin opened and result of ultrasonic test

   iii. Report of clearance measure and magnaflux test

   iv. Report of anchor and chain measuring

   v. Satisfaction notes

   vi. Certificate and survey report from classification society

   vii. Painting report :

1. Report of intern docking (ship manager, ship crew, or company's labor)
    a. report of docking work activity
    b. report of spare part changing of machine and electricity
    c. report of using material or construction material
    d. report of overhaul
    e. report of merger test result
2. Help of conducting of final negotiation (include price) with shipyard company

S. When repairing task possible to conduct by the crew, so the repairing plan delivered to the *Ship Master*

T. *Ship Master* deliver the Repairing Plan to the *Chief Officer* (head of machine room) to be conducted by the crew. The information transfer from *Chief Officer* to the crew can be a verbal or written command

U. The crew inform the repairing execution

V. *Chief Officer* send a report about the failure repairing execution to the *Ship Master*

W. *Ship Master* deliver the repairing report to the Ass Superintendent

X. *Assistant Superintendent* ask to classification society to check the result of repairing failure

Y. The classification society give the repairing check report to the *Assistant Superintendent*

Z. Having taken steps of Inspection to the report or letter of repairing report hence the report will be delivered to *Superintendent*

AA. As soon as the repairing report have been checked by superintendent, repairing have been finished and its report enclosed by Fleet Administration

BB. Outsourcing company give a payment invoice to the accounting and finance division of PT Meratus

CC. Payment from PT Meratus to Outsourcing

2. Material request

A. The crew make the material requisition proposal to *Chief Officer*

B. *Chief Officer* fill the form of material requisition evidence

C. Having get the signature from *Ship Master*, the form will be delivered to *Assistant Superintendent*

D. *Assistant Superintendent* deliver the form of material requisition to Superintendent to be analyzed about its eligibility

E. Superintendent get the data of ship maintenance record, material supply and material availability on the logistic division from the fleet administration

F. Things agreed by superintendent in the form of material requisition will be given *Assistant Superintendent* to contact logistics

G. Logistics division will release the good that asked to be delivered to pertinent ship

H. If there are insufficiency of supply or defrayal, the logistics will deliver the invoice of material requisition to accounting and finance division

I. Accounting and finance division will conduct the payment invoice

J. *Ship Master* will deliver its good to the crew to be used regularly

K. The crew give the report to *Chief Officer* about the good that have accepted

L. *Chief Officer* will make a acceptation report and must be signated by *Ship Master*

M. *Ship Master* deliver the acceptation report to *Assistant Superintendent*

N. *Assistant Superintendent* deliver the acceptation report to *Superintendent*

O. Having the requisition and acceptation report have checked by *Superintendent*, that's report will be enclosed by fleet administration

In Failure Reporting like this picture below:

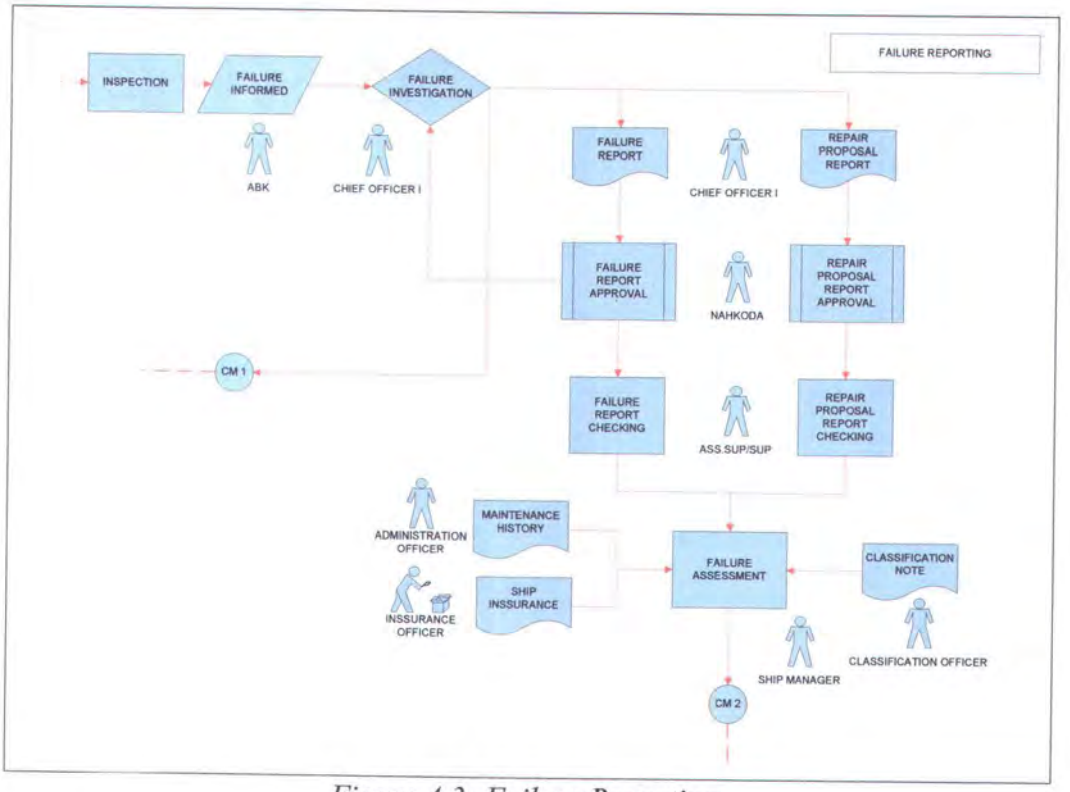


Figure 4.3: Failure Reporting

i. Every inspection between the preventive maintenance also reporting the failure. Absolutely the shipping crew as the inspector person. Every non conformity evidences should be informed to chief officer. And then Chief Officer should write in to the non conformity or failure report.

ii. The classification report or note being the ultimate consideration for hazard identification. Because it has a connection directly for certification of the ship.

iii. Will be divide into 2 term, there are corrective maintenance with minor and major case.

In the simply corrective maintenance, it means repair work be done by the shipping crew, like the picture below:

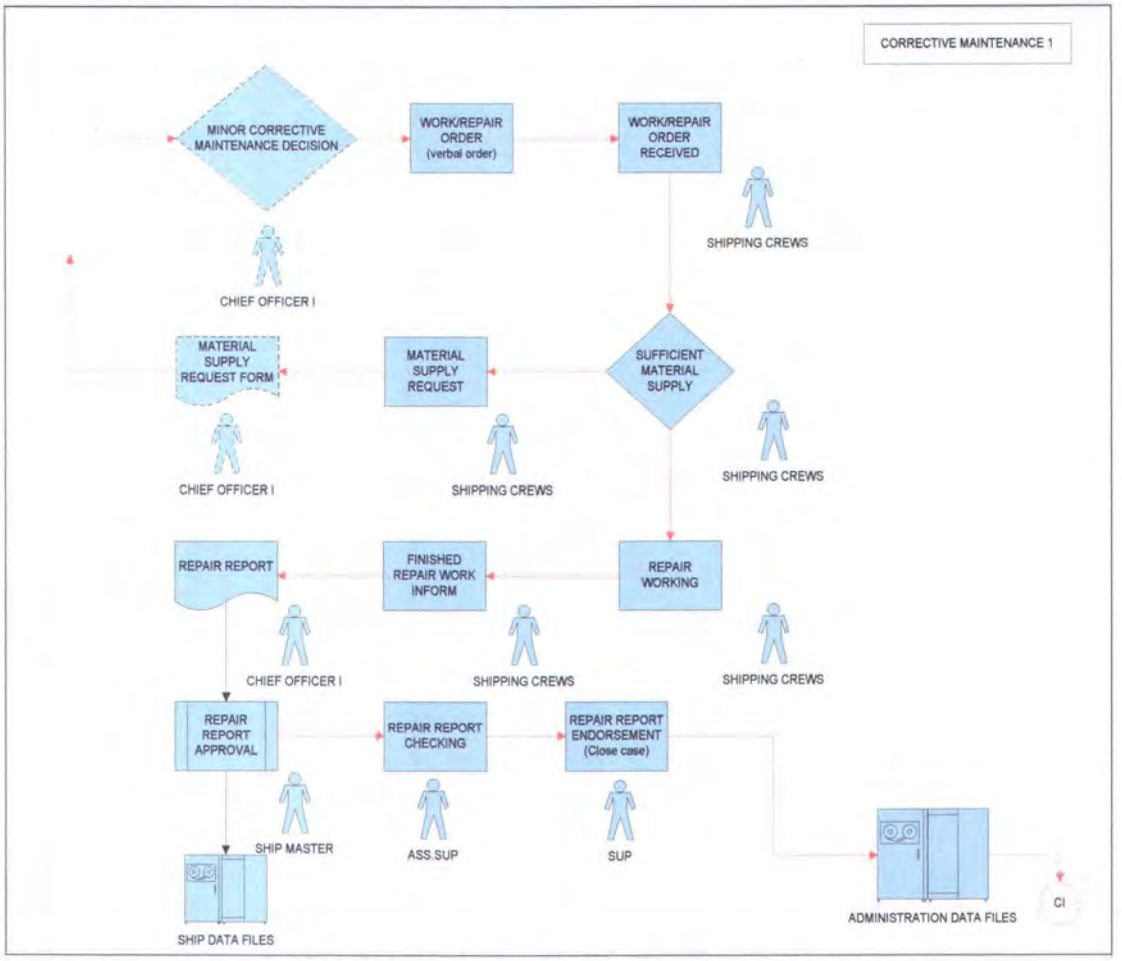


Figure 4.4: Corrective Maintenance (Minor)

i. The decision making for minor status of failure is chief officer

ii. Every form for the hull corrective maintenance should be written by chief officer

iii. Ship master give an approval sign for every report which came out from ship authority.

iv. The completion for every report is the responsibilities for the assistant superintendent.

In major corrective maintenance case, the workflow until closing work order like this picture below:

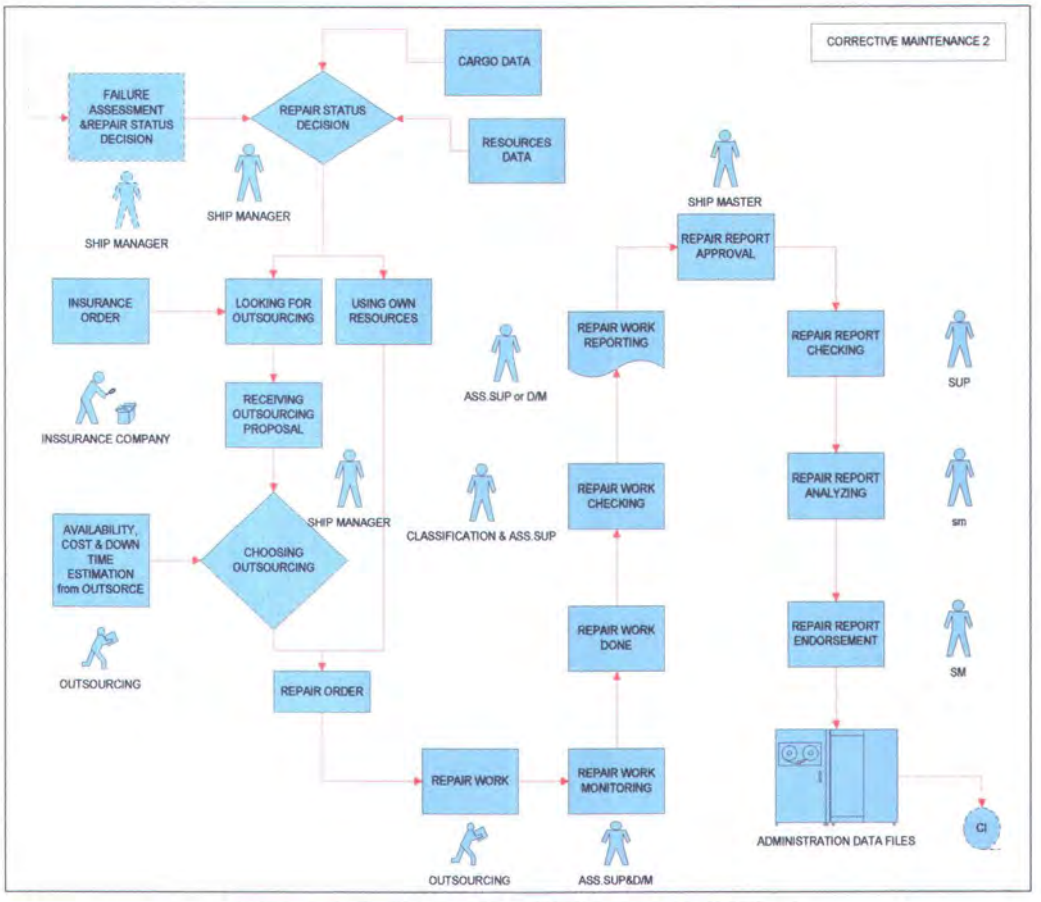


Figure 4.5: Corrective Maintenance (Major)

i. The Repair Status Decision Making is Ship Manager

ii. Because the Major Failure Level, the reparation working will be given to outsource, as a partner of Shipping Company for maintenance work.

iii. Choosing outsource will be a new task for ship manager after decide to repairing the ship by outsource. The outsource selection must consider the insurance order as a major factor. The repair cost will be paid by insurance company according to the polish assurance, if only the hull failure including in insurance agreement. As a minor factor, the income estimation is worthy to get

attention, because after choose any repair place from insurance reference, the shipping company wouldn't sacrifice the hug income to choose the repair place. Also with the cost & down time work that be offered by subcontractor & dockyard, availability space for the vessel must support the repair execution. That being compared with the other outsource repair list, to obtain the minimum cost & down time.

iv. Every works will be monitor by Dock Monitoring or assistant superintendent if Dock Monitoring unattended to monitor the repair works.

v. At the closing work order, after every form is checked by Fleet Officer, the report should filing in administration for securing data.

The Business Process of Meratus Hull Corrective Maintenance, like shown below:

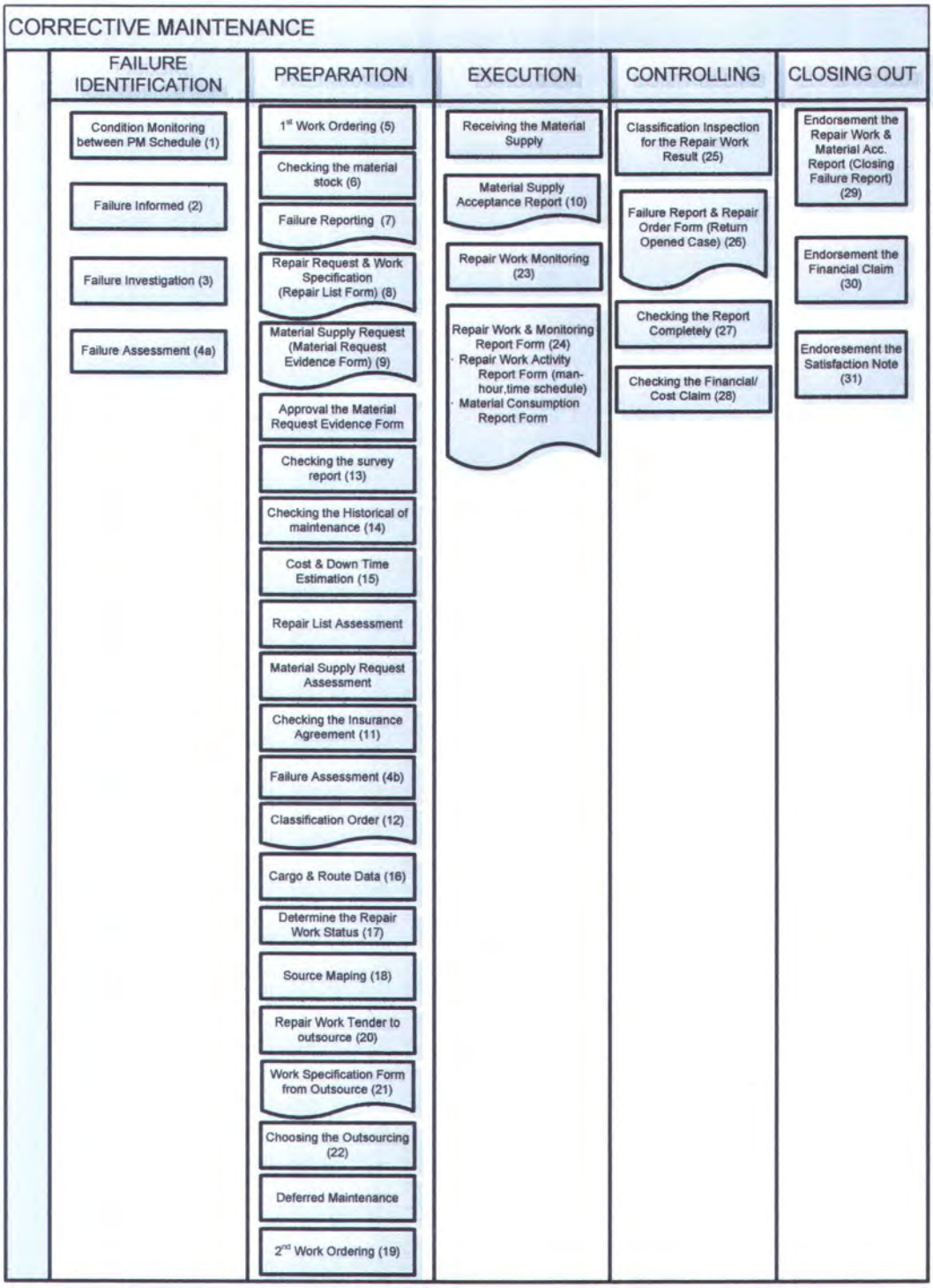


Figure 4.6: Corrective Maintenance Plotting Area

The Business Process of Corrective Maintenance, divide into 2 terms. The Corrective Maintenance refers to condition monitoring, like shown below:

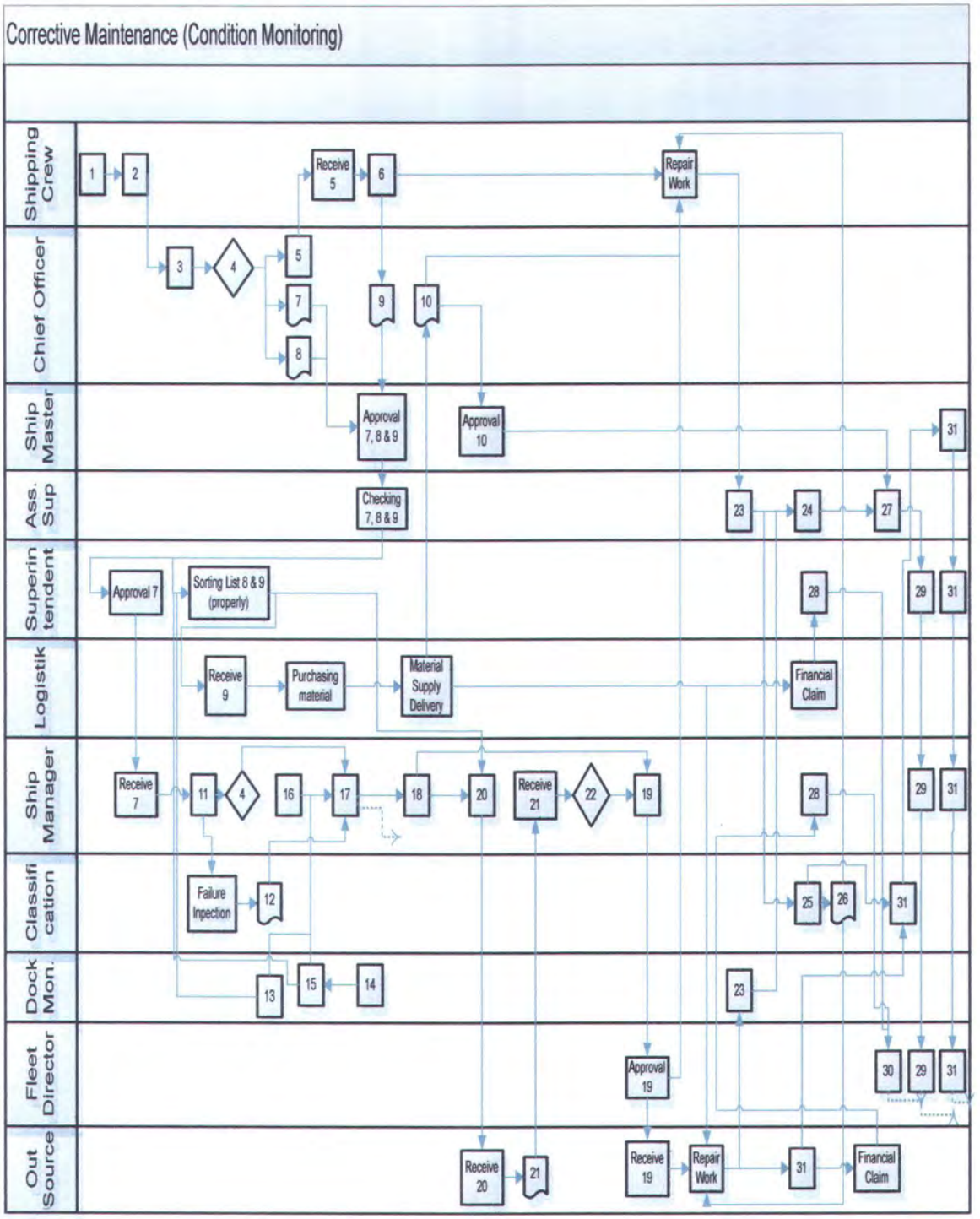


Figure 4.7 : Corrective Maintenance (Condition Monitoring)

The Corrective Maintenance refers to Planned Maintenance:

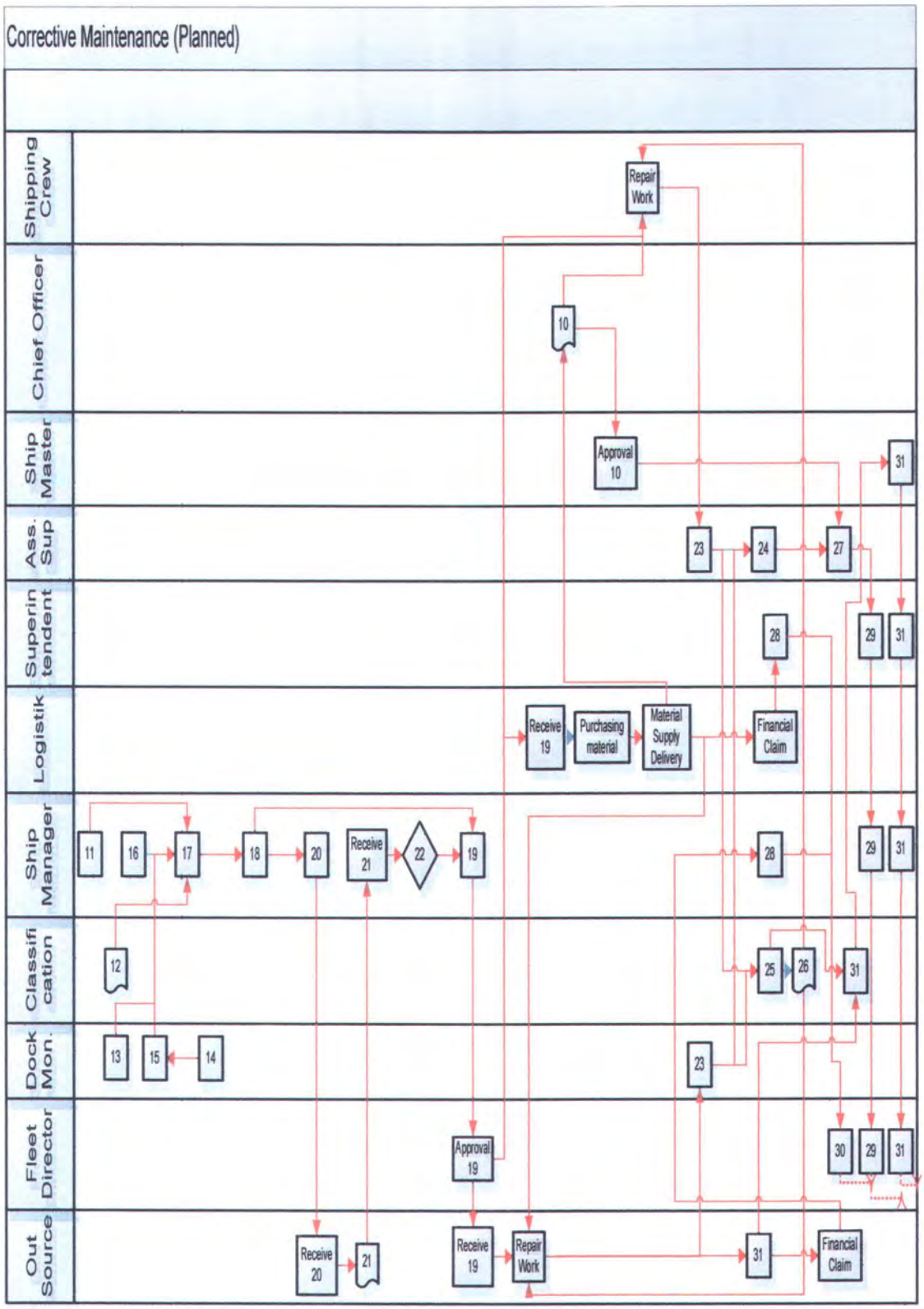


Figure 4.8 : Corrective Maintenance (Planned Maintenance)

4. 5 Constructing the Entity Relationship Diagram

Defined the sequence in hull corrective maintenance for each related person and unit in Meratus Shipping Company the next step is to make and entity relationship diagram (E-R diagram). E-R diagram is tool to describe the data requirements and assumptions in the system from a top-down perspective. E-R diagram also illustrate the logical structure of database.

There are three basic elements in ER models:

1. Entities are the "things" about which we seek information.
2. Attributes are the data we collect about the entities.
3. Relationships provide the structure needed to draw information from multiple entities.

Developing an E-R diagram requires an understanding of the system and its components. The step to build E-R diagram is:

1. Define Entities: these are usually nouns used in descriptions of the system
2. Define Relationships: these are usually verbs used in descriptions of the system

For the example, there are the E-R diagrams in Corrective Maintenance for Hull Maintenance Database use SQL Server.

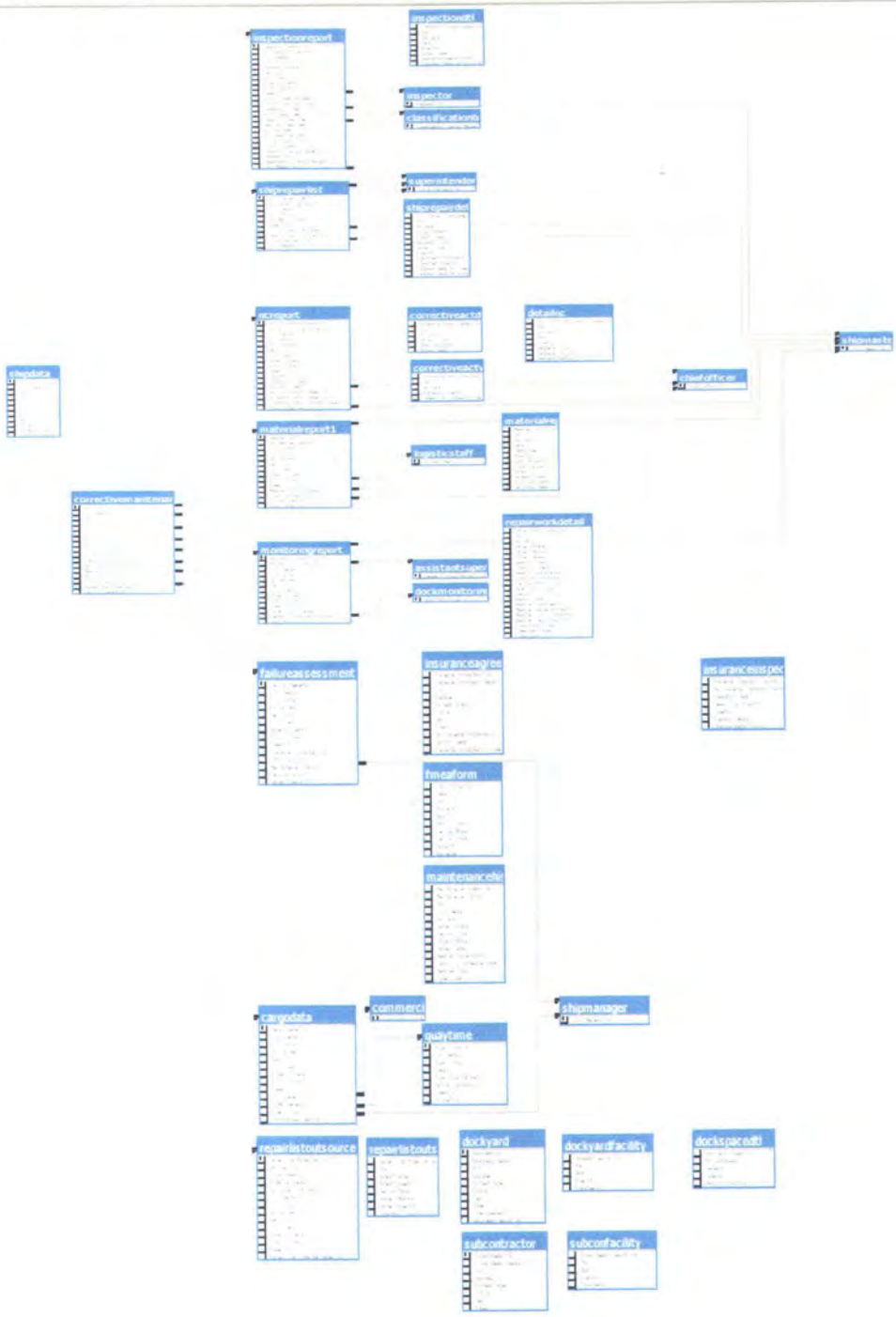


Figure 4.9 : E – R Diagram for Hull Corrective Maintenance

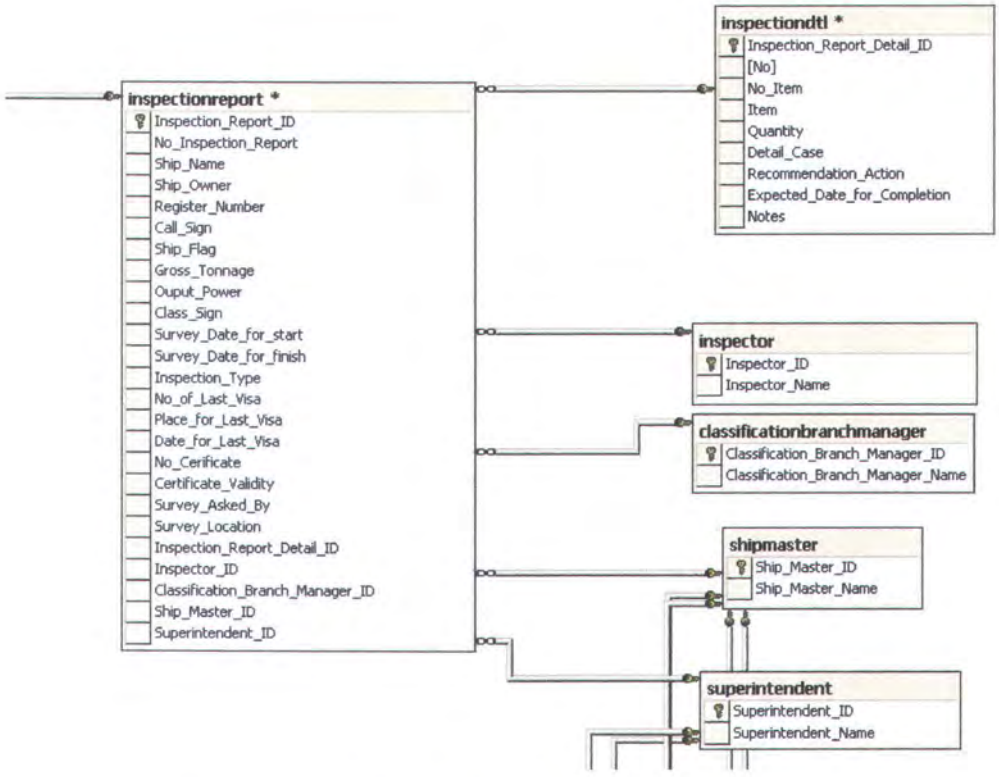


Figure 4.10: E – R Diagram for Inspection Report

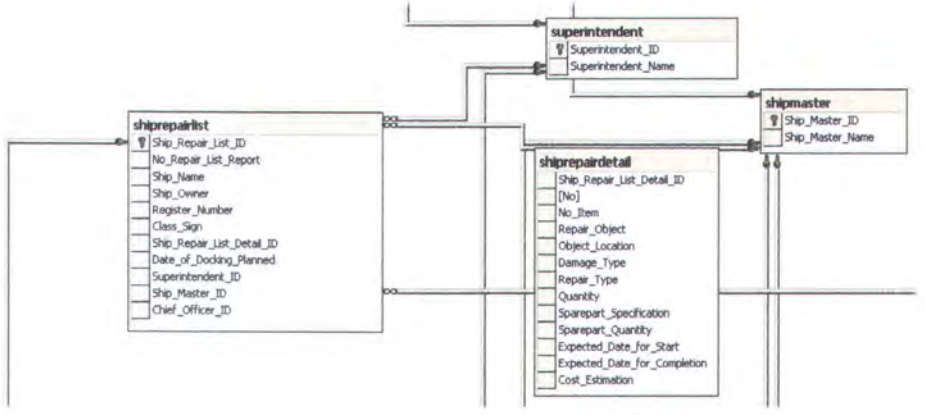


Figure 4.11: E – R Diagram for Ship Repair List

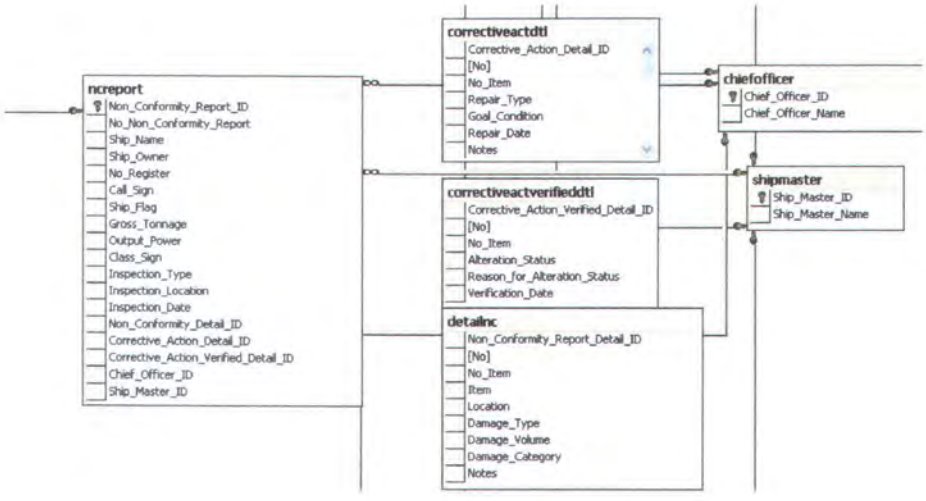


Figure 4.12: E – R Diagram for Failure Report

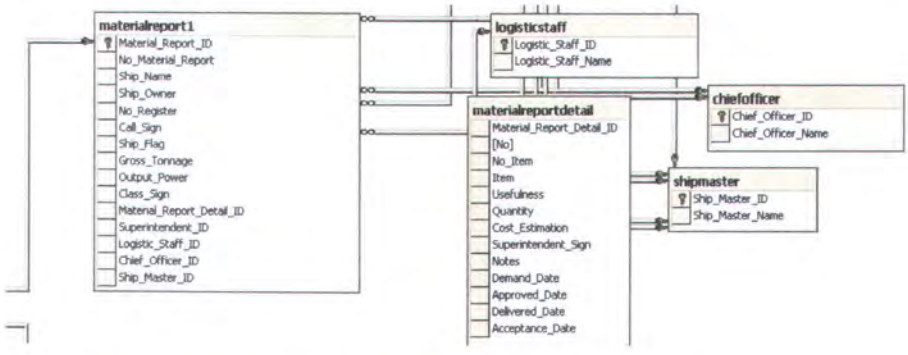


Figure 4.13: E – R Diagram for Material Report

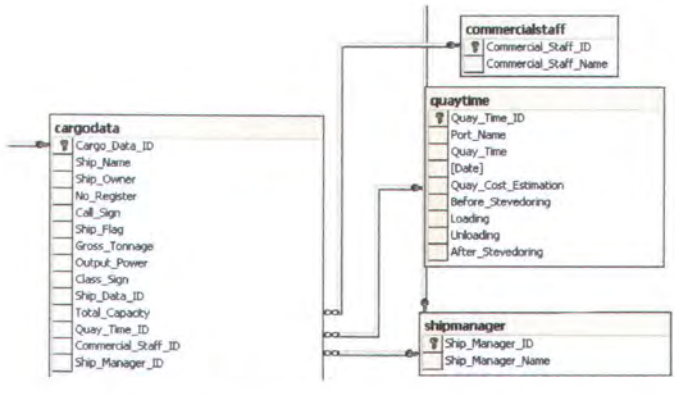


Figure 4.14: E – R Diagram for Cargo Data

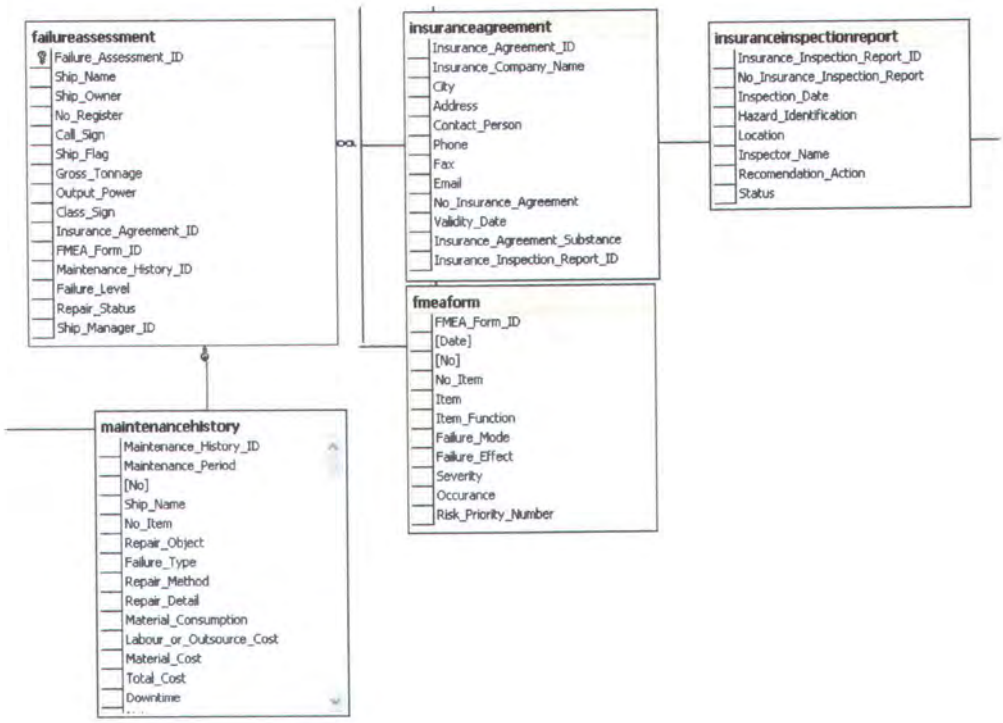


Figure 4.15: E – R Diagram for Failure Assessment

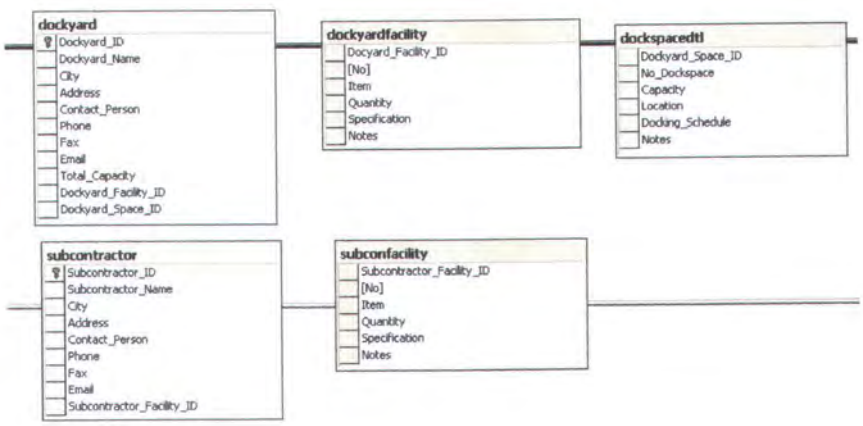


Figure 4.16: E – R Diagram for Dockyard & Subcontractor

Figure 4.17: E – R Diagram for Repairlist Outsource

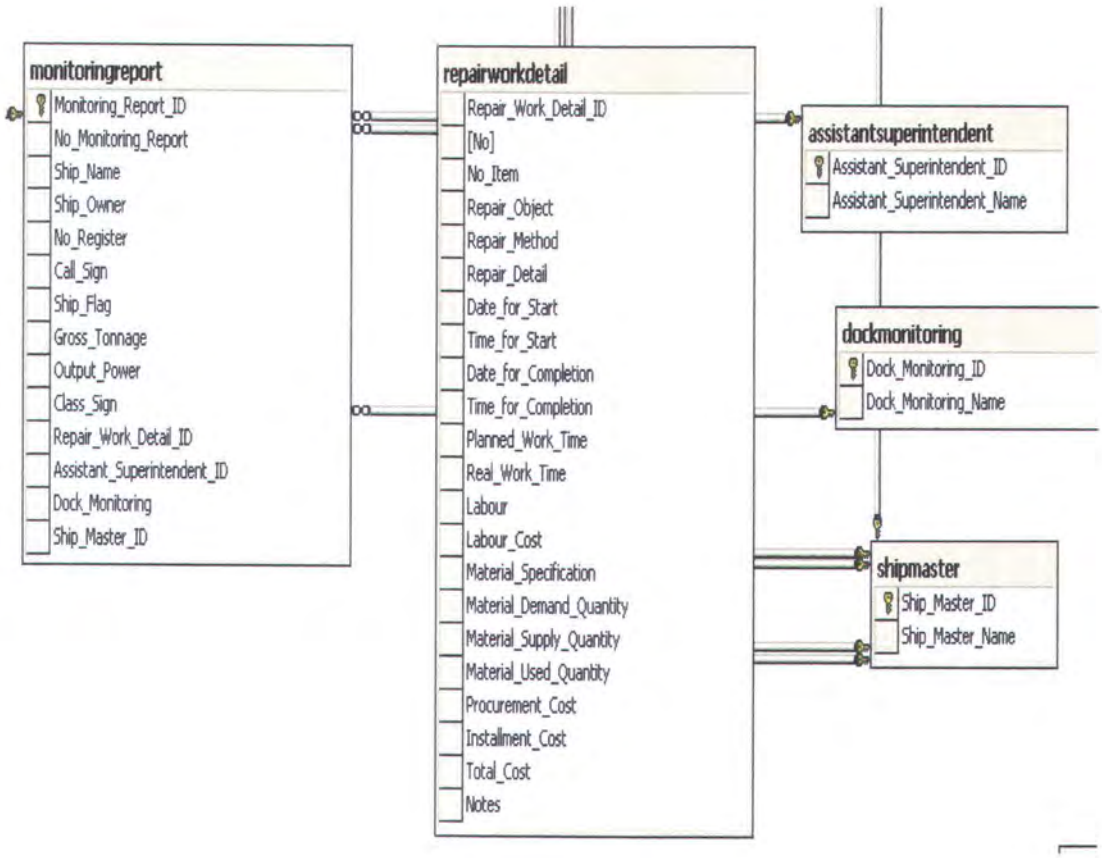


Figure 4.18: E – R Diagram for Monitoring Report

4. 6 Physical Table Design

Designing of this Corrective Maintenance Module will be dividing into:

- Database Design

Data kept in a storage data base by a system that called database management system.

As for stages the steps to design of data subsystem shall be as follows:

a. Analysis step

At this phase is analyzed the workflow or relationship that happened among entity.

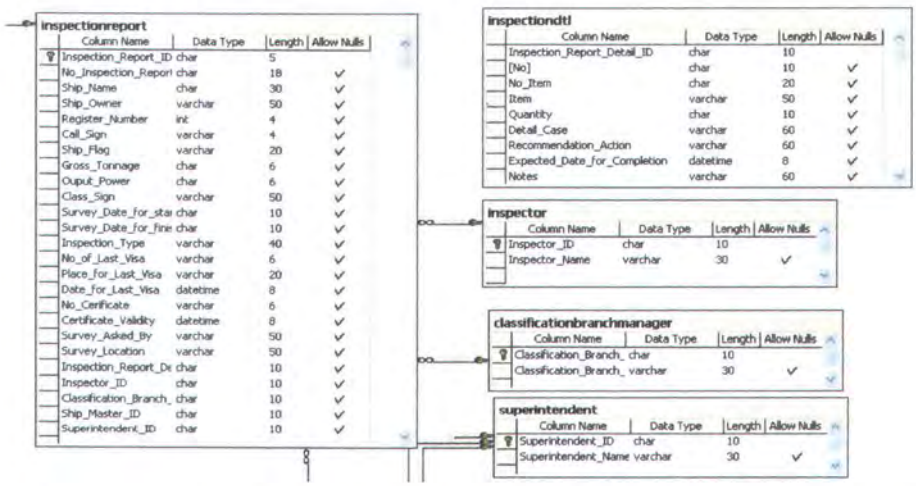
b. Logical database design step

Adding an attributes to the entity at this phase.

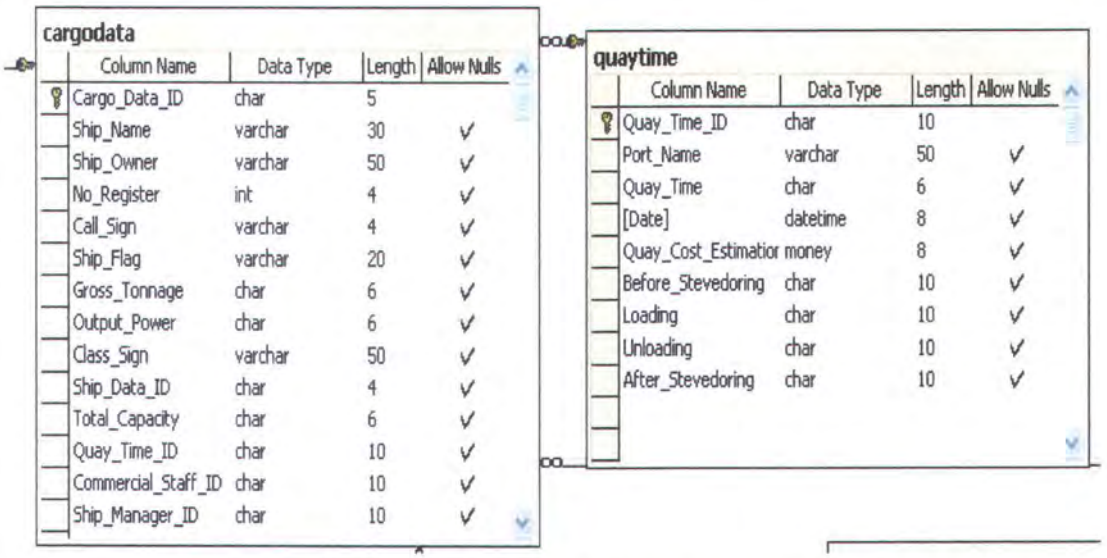
c. Physical design step

At this step we will create a new table in form of physical.

The picture below will give us such of sample of physical table, which created in Microsoft SQL Server.



Picture 4.19: Physical table Inspection form in Microsoft SQL Server



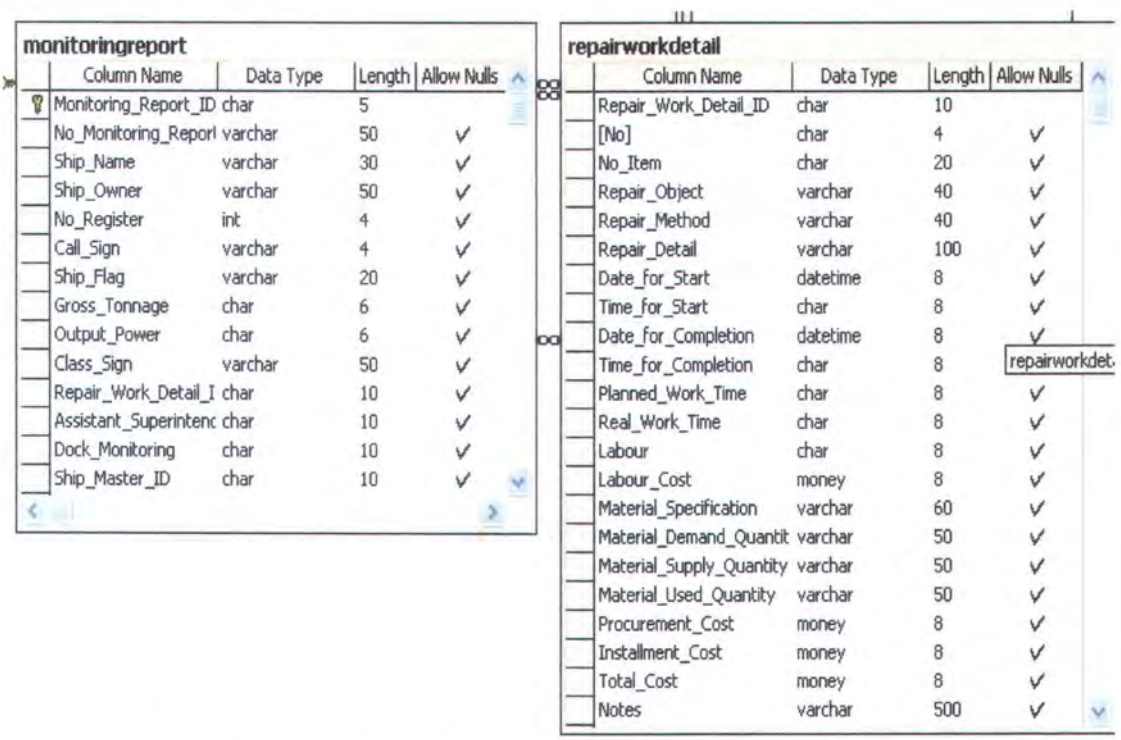
cargodata

Column Name	Data Type	Length	Allow Nulls
Cargo_Data_ID	char	5	
Ship_Name	varchar	30	✓
Ship_Owner	varchar	50	✓
No_Register	int	4	✓
Call_Sign	varchar	4	✓
Ship_Flag	varchar	20	✓
Gross_Tonnage	char	6	✓
Output_Power	char	6	✓
Class_Sign	varchar	50	✓
Ship_Data_ID	char	4	✓
Total_Capacity	char	6	✓
Quay_Time_ID	char	10	✓
Commercial_Staff_ID	char	10	✓
Ship_Manager_ID	char	10	✓

quaytime

Column Name	Data Type	Length	Allow Nulls
Quay_Time_ID	char	10	
Port_Name	varchar	50	✓
Quay_Time	char	6	✓
[Date]	datetime	8	✓
Quay_Cost_Estimatior	money	8	✓
Before_Stevedoring	char	10	✓
Loading	char	10	✓
Unloading	char	10	✓
After_Stevedoring	char	10	✓

Picture 4.20: Physical table cargo data & quay time form in Microsoft SQL Server



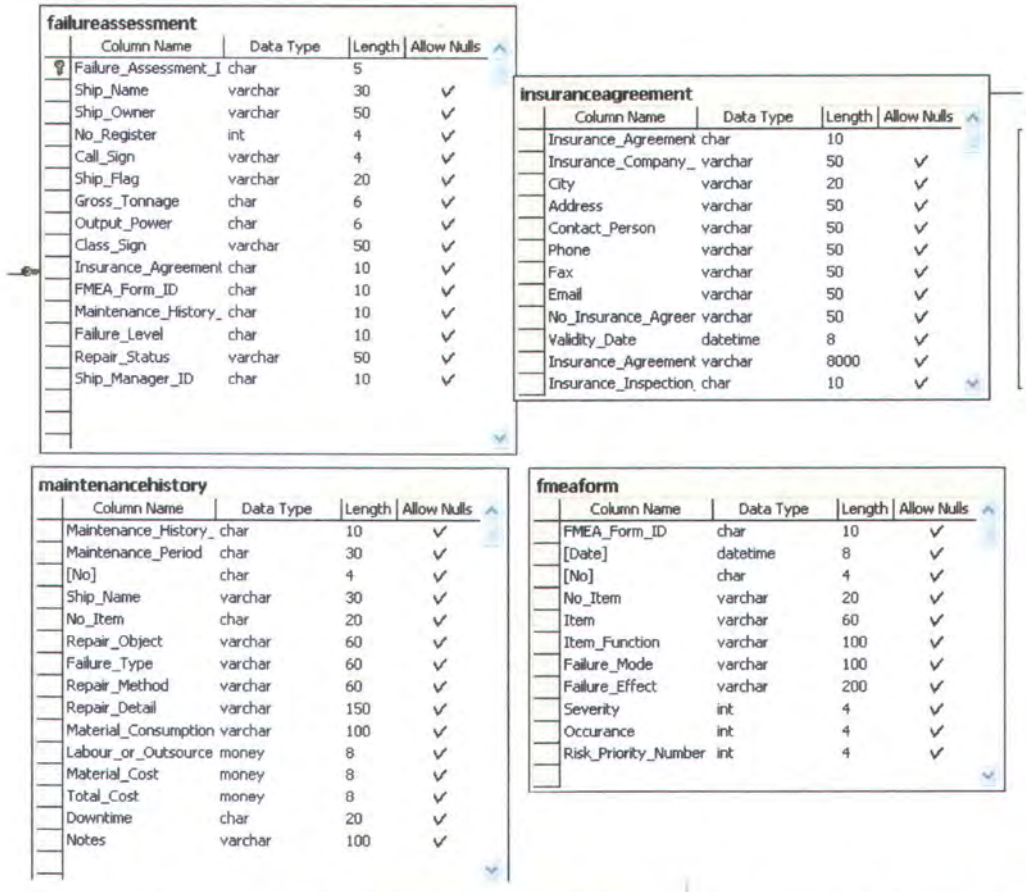
monitoringreport

Column Name	Data Type	Length	Allow Nulls
Monitoring_Report_ID	char	5	
No_Monitoring_Report	varchar	50	✓
Ship_Name	varchar	30	✓
Ship_Owner	varchar	50	✓
No_Register	int	4	✓
Call_Sign	varchar	4	✓
Ship_Flag	varchar	20	✓
Gross_Tonnage	char	6	✓
Output_Power	char	6	✓
Class_Sign	varchar	50	✓
Repair_Work_Detail_I	char	10	✓
Assistant_Superintenc	char	10	✓
Dock_Monitoring	char	10	✓
Ship_Master_ID	char	10	✓

repairworkdetail

Column Name	Data Type	Length	Allow Nulls
Repair_Work_Detail_ID	char	10	
[No]	char	4	✓
No_Item	char	20	✓
Repair_Object	varchar	40	✓
Repair_Method	varchar	40	✓
Repair_Detail	varchar	100	✓
Date_for_Start	datetime	8	✓
Time_for_Start	char	8	✓
Date_for_Completion	datetime	8	✓
Time_for_Completion	char	8	repairworkdet
Planned_Work_Time	char	8	✓
Real_Work_Time	char	8	✓
Labour	char	8	✓
Labour_Cost	money	8	✓
Material_Specification	varchar	60	✓
Material_Demand_Quantit	varchar	50	✓
Material_Supply_Quantity	varchar	50	✓
Material_Used_Quantity	varchar	50	✓
Procurement_Cost	money	8	✓
Installment_Cost	money	8	✓
Total_Cost	money	8	✓
Notes	varchar	500	✓

Picture 4.21 Physical table monitoring report & repairworkdetail form in Microsoft SQL Server



failureassessment

Column Name	Data Type	Length	Allow Nulls
Failure_Assessment_I	char	5	
Ship_Name	varchar	30	✓
Ship_Owner	varchar	50	✓
No_Register	int	4	✓
Call_Sign	varchar	4	✓
Ship_Flag	varchar	20	✓
Gross_Tonnage	char	6	✓
Output_Power	char	6	✓
Class_Sign	varchar	50	✓
Insurance_Agreement	char	10	✓
FMEA_Form_ID	char	10	✓
Maintenance_History_	char	10	✓
Failure_Level	char	10	✓
Repair_Status	varchar	50	✓
Ship_Manager_ID	char	10	✓

insuranceagreement

Column Name	Data Type	Length	Allow Nulls
Insurance_Agreement	char	10	
Insurance_Company_	varchar	50	✓
City	varchar	20	✓
Address	varchar	50	✓
Contact_Person	varchar	50	✓
Phone	varchar	50	✓
Fax	varchar	50	✓
Email	varchar	50	✓
No_Insurance_Agreer	varchar	50	✓
Validity_Date	datetime	8	✓
Insurance_Agreement	varchar	8000	✓
Insurance_Inspection_	char	10	✓

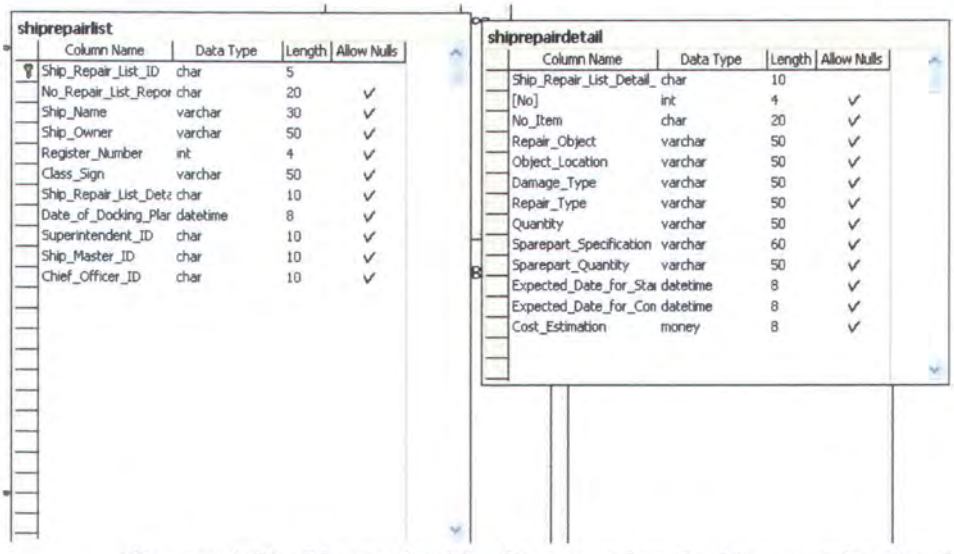
maintenancehistory

Column Name	Data Type	Length	Allow Nulls
Maintenance_History_	char	10	✓
Maintenance_Period	char	30	✓
[No]	char	4	✓
Ship_Name	varchar	30	✓
No_Item	char	20	✓
Repair_Object	varchar	60	✓
Failure_Type	varchar	60	✓
Repair_Method	varchar	60	✓
Repair_Detail	varchar	150	✓
Material_Consumption	varchar	100	✓
Labour_or_Outsource	money	8	✓
Material_Cost	money	8	✓
Total_Cost	money	8	✓
Downtime	char	20	✓
Notes	varchar	100	✓

fmeaform

Column Name	Data Type	Length	Allow Nulls
FMEA_Form_ID	char	10	✓
[Date]	datetime	8	✓
[No]	char	4	✓
No_Item	varchar	20	✓
Item	varchar	60	✓
Item_Function	varchar	100	✓
Failure_Mode	varchar	100	✓
Failure_Effect	varchar	200	✓
Severity	int	4	✓
Occurance	int	4	✓
Risk_Priority_Number	int	4	✓

Picture 4.22: Physical table failure assessment, insurance agreement, maintenance history & FMEA form in Microsoft SQL Server



shiprepairlist

Column Name	Data Type	Length	Allow Nulls
Ship_Repair_List_ID	char	5	
No_Repair_List_Repor	char	20	✓
Ship_Name	varchar	30	✓
Ship_Owner	varchar	50	✓
Register_Number	int	4	✓
Class_Sign	varchar	50	✓
Ship_Repair_List_Deta	char	10	✓
Date_of_Docking_Plar	datetime	8	✓
Superintendent_ID	char	10	✓
Ship_Master_ID	char	10	✓
Chief_Officer_ID	char	10	✓

shiprepairdetail

Column Name	Data Type	Length	Allow Nulls
Ship_Repair_List_Detail_	char	10	
[No]	int	4	✓
No_Item	char	20	✓
Repair_Object	varchar	50	✓
Object_Location	varchar	50	✓
Damage_Type	varchar	50	✓
Repair_Type	varchar	50	✓
Quantity	varchar	50	✓
Sparepart_Specification	varchar	60	✓
Sparepart_Quantity	varchar	50	✓
Expected_Date_for_Sta	datetime	8	✓
Expected_Date_for_Con	datetime	8	✓
Cost_Estimation	money	8	✓

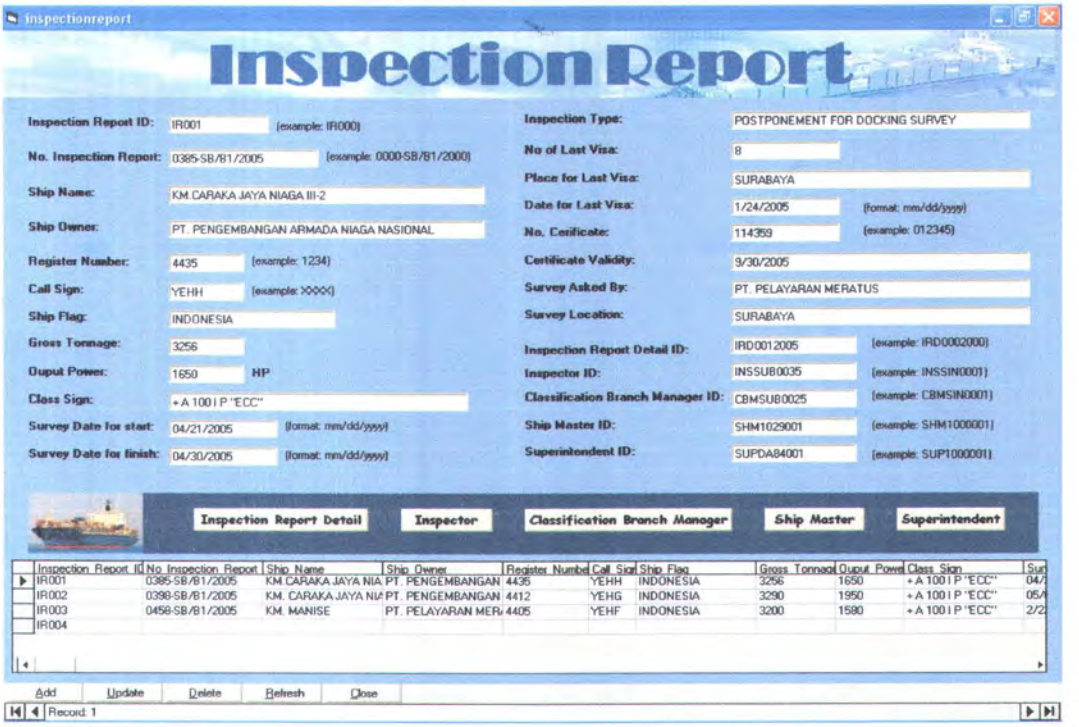
Picture 4.23: Physical table shiprepairlist & shiprepairlistdetail form in Microsoft SQL Server

4.7 User Interface Design

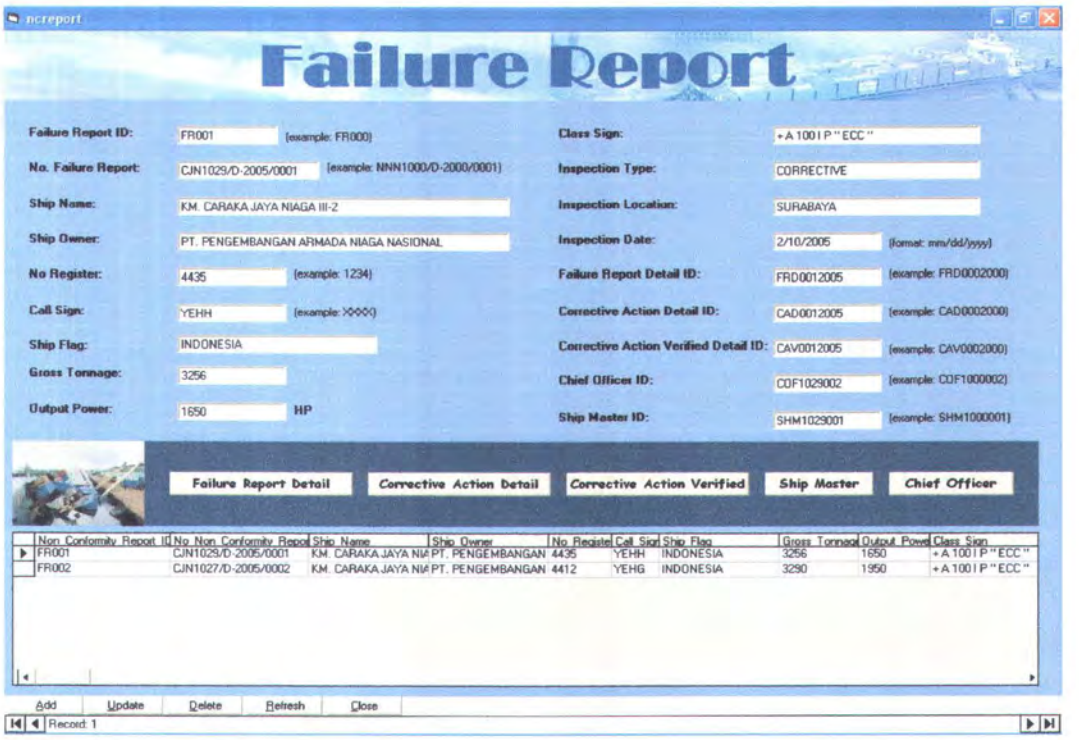
- Design the user interface for Corrective Maintenance DBMS

The facility to integrate the system with the user interface. With the Microsoft Visual Basic 6.0 software, user interface have been created. And being hope that this design as known as user friendly software for Hull Corrective Maintenance Database System. There are some such of example the user interface.

Picture 4.24: User Interface Corrective Main menu create using Visual Basic 6

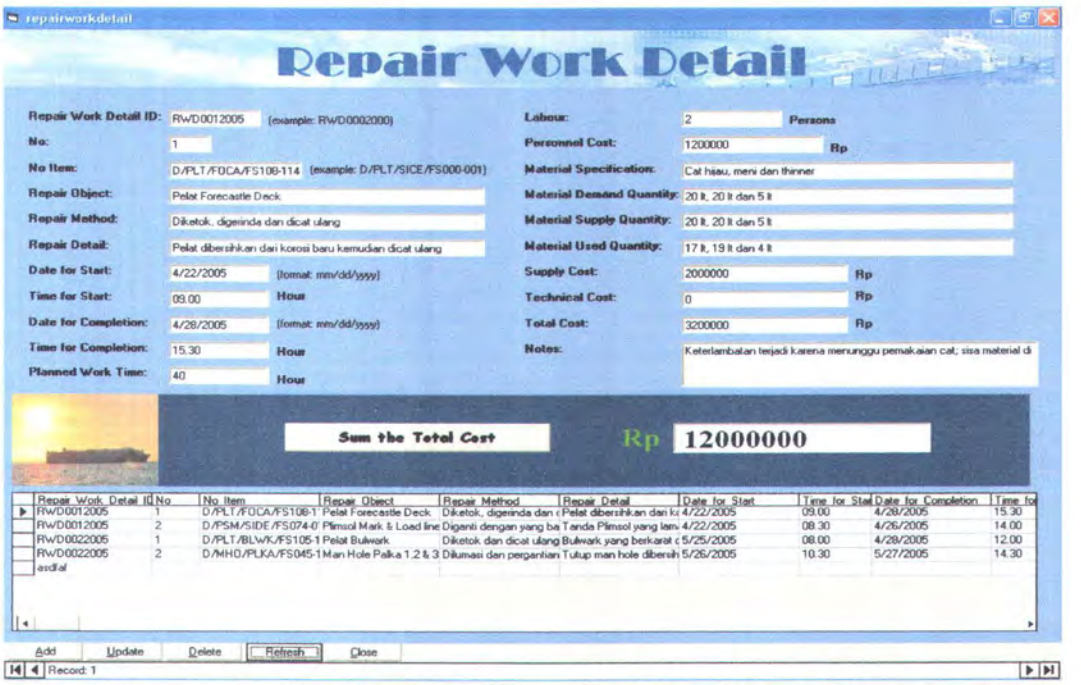


Picture 4.25: User Interface Inspection Report Input Data menu create using Visual Basic 6

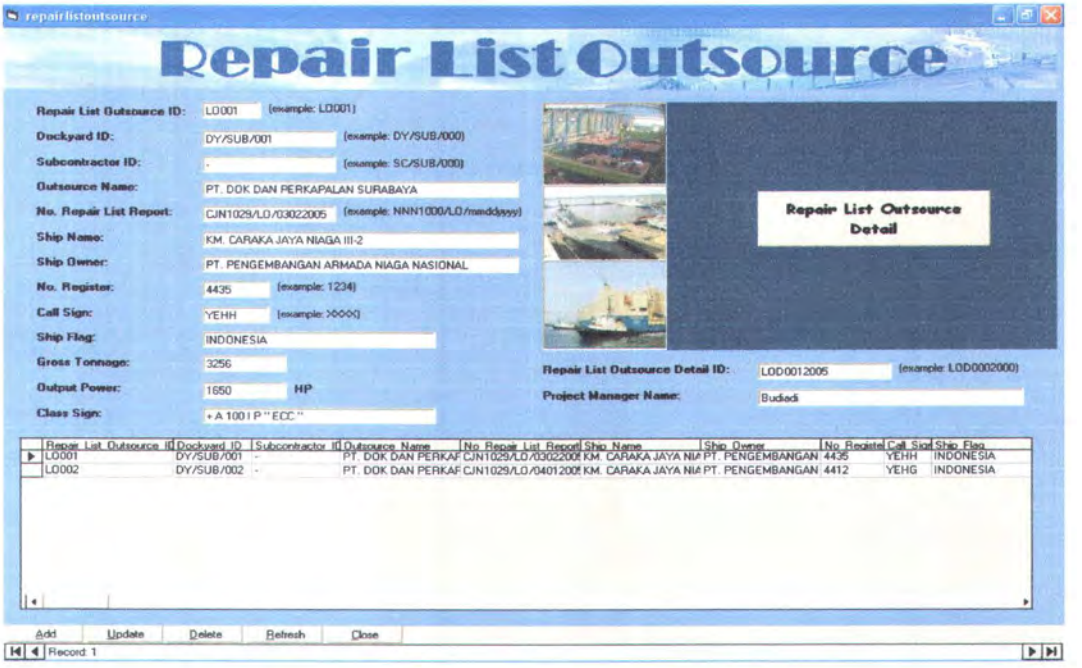


Picture 4.26: User Interface Failure Report Input Data menu create using Visual Basic 6

Picture 4.27: User Interface Material Report Detail Input Data menu create using Visual Basic 6



Picture 4.28: User Interface Repair Work Detail Input Data menu create using Visual Basic 6



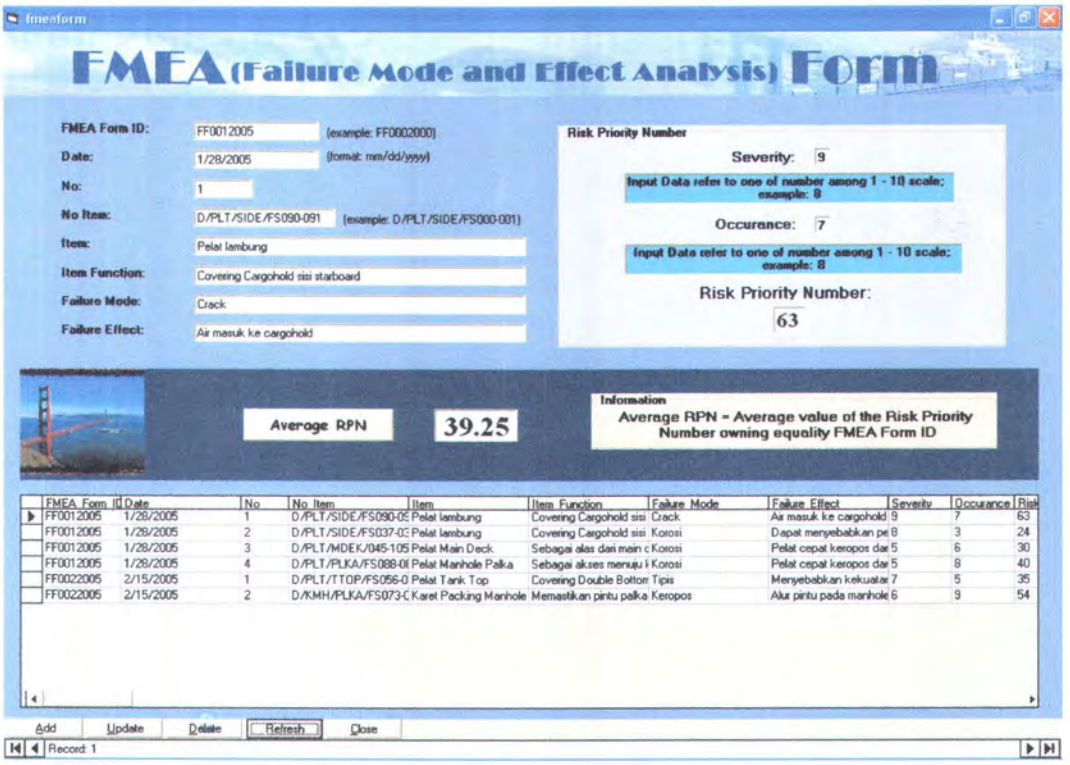
Picture 4.29: User Interface Repair List Outsource Input Data menu create using Visual Basic 6

Picture 4.30: User Interface Repair List Outsource Detail Input Data menu create using Visual Basic 6

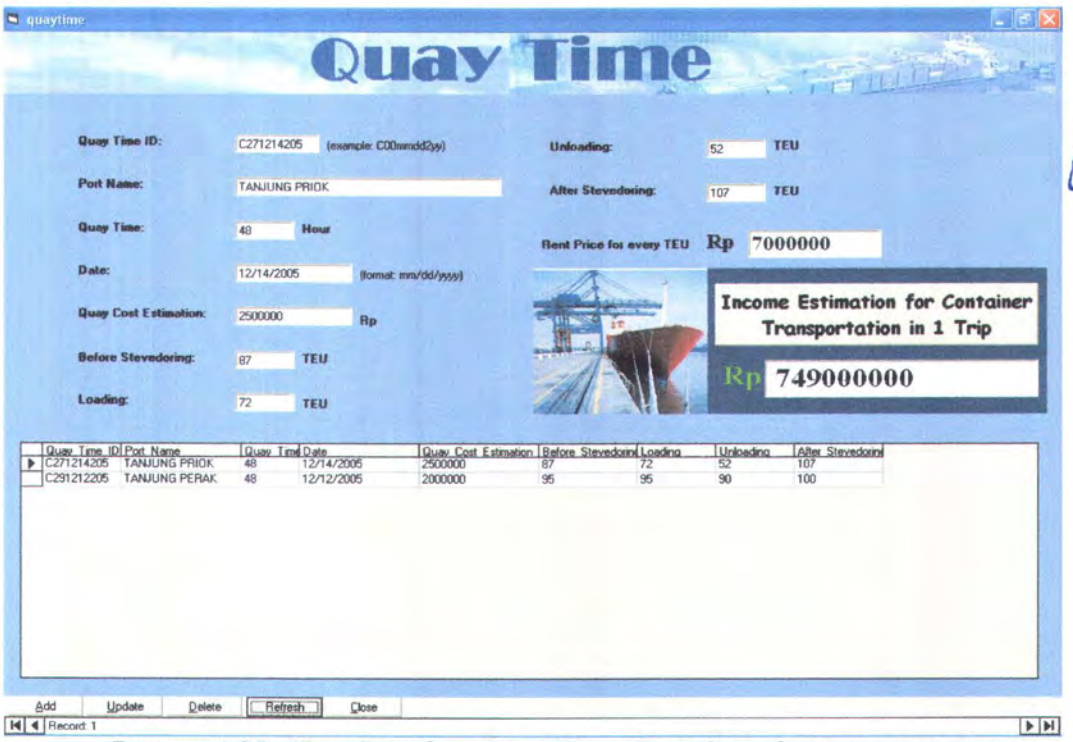
Picture 4.31: User Interface Ship Master menu create using Visual Basic 6

Picture 4.32: User Interface Superintendent menu create using Visual Basic 6

Picture 4.33: User Interface Ship Manager menu create using Visual Basic 6

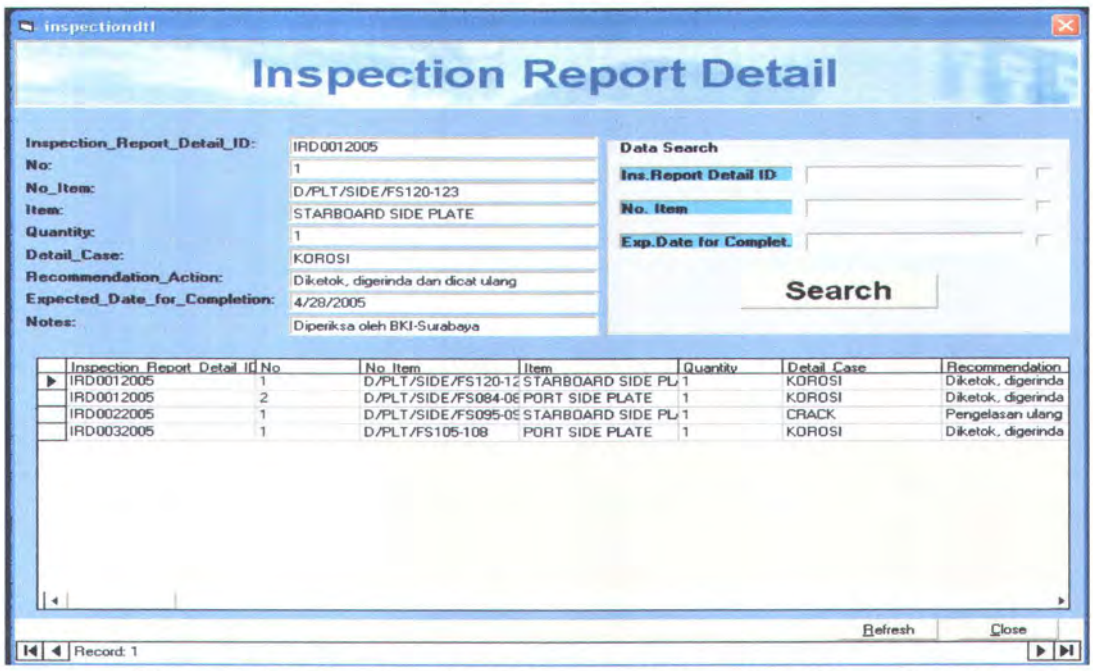


Picture 4.34: User Interface FMEA Form Data Search menu create using Visual Basic 6



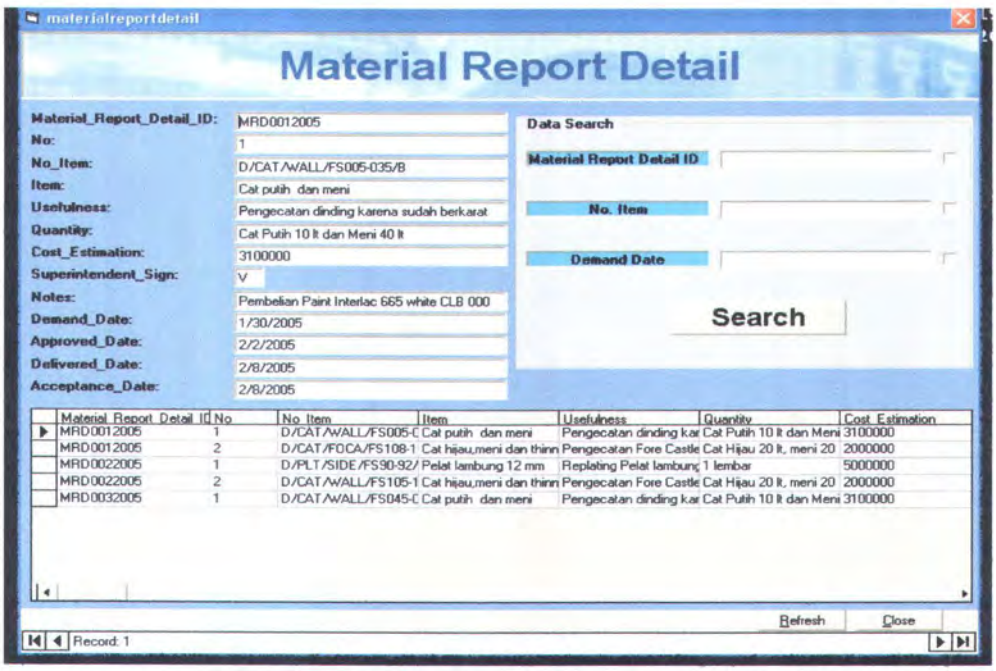
Picture 4.35: User Interface Quay Time Data Search menu create using Visual Basic 6

Picture 4.36: User Interface Inspection Report Data Search menu create using Visual Basic 6

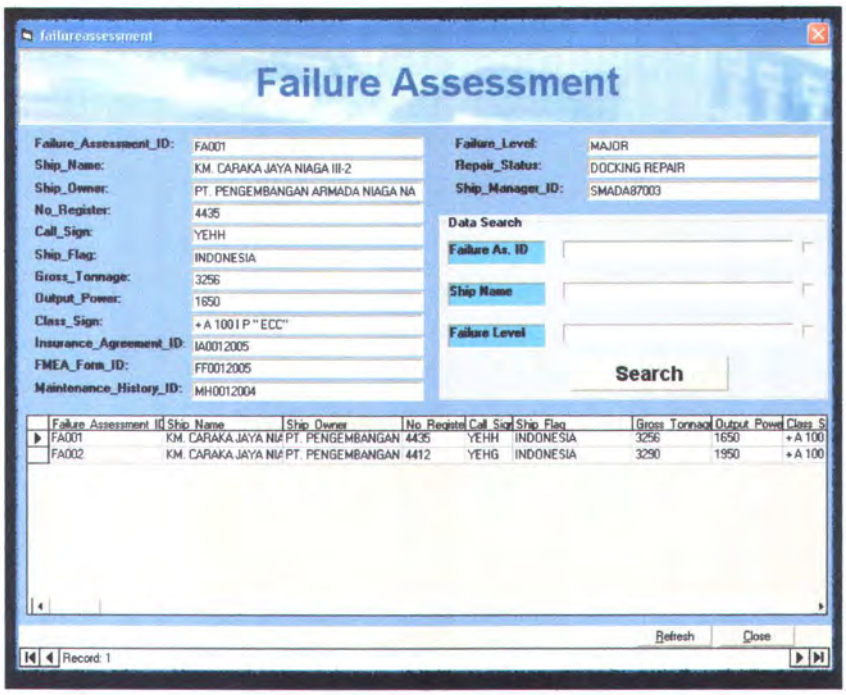


Picture 4.37: User Interface Inspection Report Detail Data Search menu create using Visual Basic 6

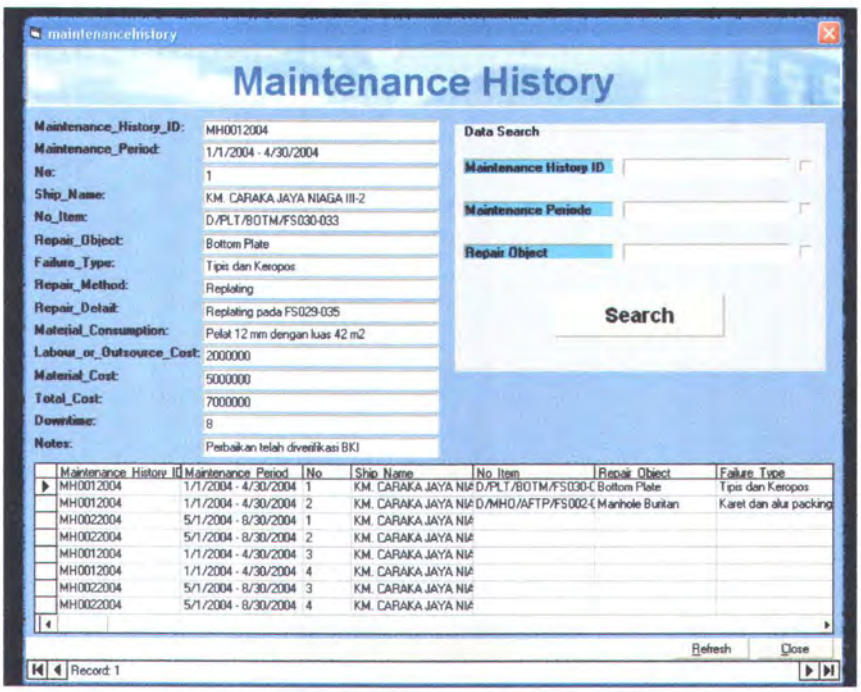
Picture 4.38: User Interface Repair Work Detail Data Search menu create using Visual Basic 6



Picture 4.39: User Interface Material Report Detail Data Search menu create using Visual Basic 6



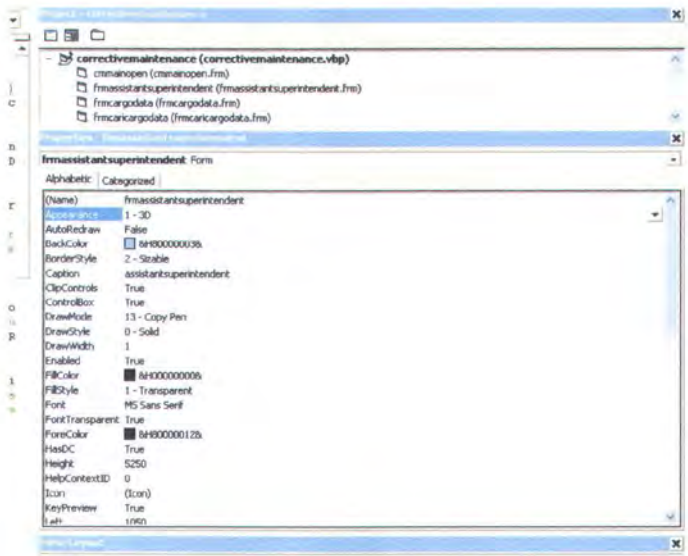
Picture 4.40: User Interface Repair Work Detail Data Search menu create using Visual Basic 6



Picture 4.41: User Interface Repair Work Detail Data Search menu create using Visual Basic 6

4.8 Source Code Program

Therefore, in constructing the software application, we need some source code program, as known as syntax program. It will help to translate our software requirement, into programming code that have been recognized by software language programming. By using the logical and computerize ability, build the software environment for our interface form. The first thing that we should know how to change the program setting, called as Properties use.



Picture 4.42: Properties tool for Assistant Superintendent form

And other way we need some source code software for the interface dock access. For the example, when we press the command button in interface from, the command button will receive our order and then try to seek the source code that we have been written. With the source code, our environment programs will be change obey our order after the running programs.

For the examples, some of source codes program will be shown below:

Source Code for commonly load the programming variables

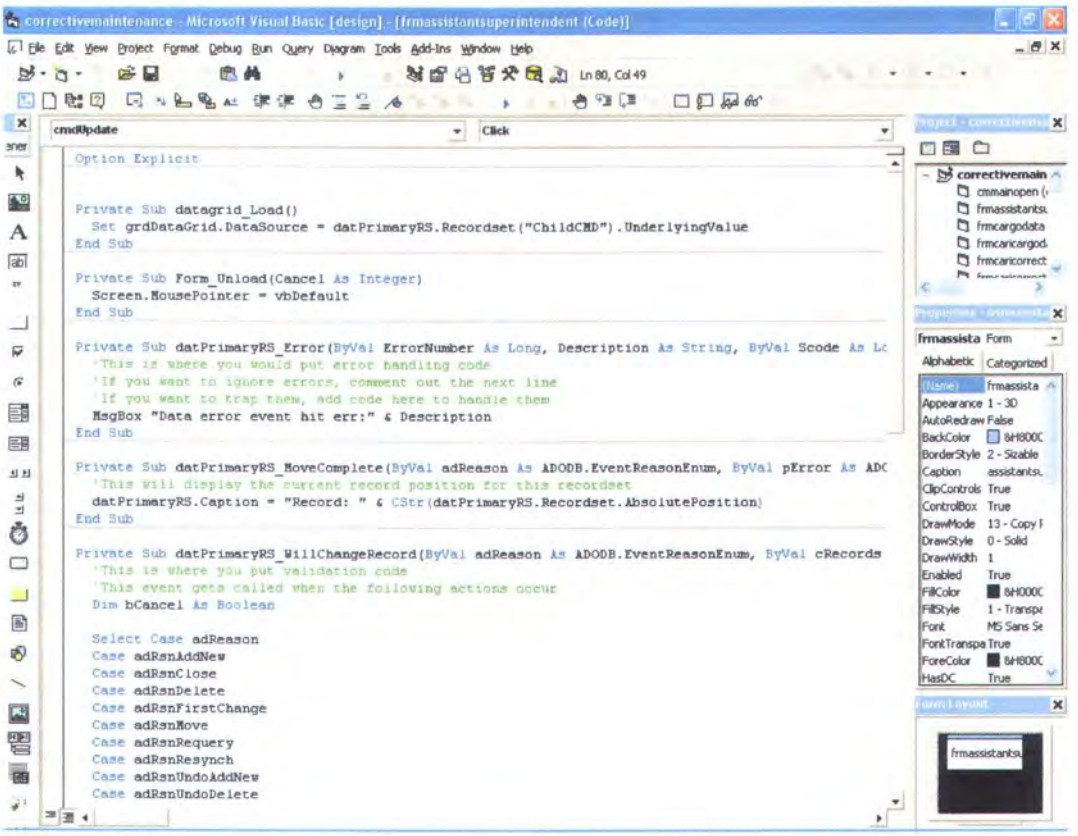
(Assistant Superintendent Form)

```
Option Explicit
Private Sub datagrid_Load()
Set grdDataGrid.DataSource =
datPrimaryRS.Recordset("ChildCMD").UnderlyingValue
End Sub
Private Sub Form_Unload(Cancel As Integer)
Screen.MousePointer = vbDefault
End Sub
Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long,
Description As String, ByVal Scode As Long, ByVal Source As
String, ByVal HelpFile As String, ByVal HelpContext As Long,
fCancelDisplay As Boolean)
'This is where you would put error handling code
'If you want to ignore errors, comment out the next line
'If you want to trap them, add code here to handle them
MsgBox "Data error event hit err:" & Description
End Sub
Private Sub datPrimaryRS_MoveComplete(ByVal adReason As
ADODB.EventReasonEnum, ByVal pError As ADODB.Error,
```

```
adStatus As ADODB.EventStatusEnum, ByVal pRecordset As
ADODB.Recordset)
'This will display the current record position for this recordset
datPrimaryRS.Caption = "Record: " &
CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub
Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As
ADODB.EventReasonEnum, ByVal cRecords As Long, adStatus As
ADODB.EventStatusEnum, ByVal pRecordset As
ADODB.Recordset)
'This is where you put validation code
'This event gets called when the following actions occur
Dim bCancel As Boolean
Select Case adReason
Case adRsnAddNew
Case adRsnClose
Case adRsnDelete
Case adRsnFirstChange
Case adRsnMove
Case adRsnRequery
Case adRsnResynch
Case adRsnUndoAddNew
Case adRsnUndoDelete
```

```
Case adRsnUndoUpdate
Case adRsnUpdate
End Select
If bCancel Then adStatus = adStatusCancel
End Sub
Private Sub cmdAdd_Click()
On Error GoTo AddErr
datPrimaryRS.Recordset.AddNew
Exit Sub
AddErr:
MsgBox Err.Description
End Sub
Private Sub cmdDelete_Click()
On Error GoTo DeleteErr
With datPrimaryRS.Recordset
.Delete
.MoveNext
If .EOF Then .MoveLast
End With
Exit Sub
DeleteErr:
MsgBox Err.Description
End Sub
```

```
Private Sub cmdRefresh_Click()
'This is only needed for multi user apps
On Error GoTo RefreshErr
   datPrimaryRS.RecordSource = "Select * From
   assistantsuperintendent"
datPrimaryRS.Refresh
Exit Sub
RefreshErr:
MsgBox Err.Description
End Sub
Private Sub cmdUpdate_Click()
On Error GoTo UpdateErr
datPrimaryRS.Recordset.UpdateBatch adAffectAll
Exit Sub
UpdateErr: MsgBox Err.Description
End Sub
Private Sub cmdClose_Click()
Unload Me
End Sub
```



Picture 4.43: Source Code for Assistant Superintendent Form

When our source code programs that we have been written was right, the programs implementation have been succeeded to the test connection. But if our source code was wrong, it will be shown by warning message box. Then we should fix our source code, as known as debugging programs. After we finish writing every source codes programs, keep in mind to always try to running the programs. It will help us to obtain the software failure identification as soon as possible. So we may not to fix the complicated and large of software source codes in other time.

CHAPTER V

CONCLUSION AND SUGGESTION

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CONCLUSION AND SUGGESTION

After finished the final project, we should evaluated and analyzed the implementation of the Hull Corrective Maintenance Module. According to the evaluation and analyzing from this final project, we obtained some conclusion and suggestion concerning this final project.

5.1 Conclusion

Based on the evaluation, we got some conclusions that will be explained below:

a. With the implementation of Hull Corrective Maintenance Module, expected will assist the performance from hull maintenance reporting especially in corrective maintenance. Depository and data seeking more efficient than using a lot of paper sheet.

b. Hull Corrective Maintenance Module also assists the data access from many persons related in maintenance connection. Not only in one division (Fleet Division), but also with the other (Commercial Staff).

c. There are directly connections between failure evidences, insurance agreements, and maintenance history also cargos data to determine the repair status. And then it will become one of consideration to choosing outsource for hull maintenance.

5.2 Suggestion

As for suggestion which can be obtained by after running the Hull Corrective Maintenance Module shall be explain as follows:

a. By giving attention to this Hull Corrective Maintenance Module, next time perhaps there will be an internal software development (components). For improvement connection or integration programs with a good information management system in shipping companies.

b. Integration with the other key maintenance area ought to conduct. With the other word, perhaps there will be development of planning/scheduling and continuous improvement maintenance module.

BIBLIOGRAPHY

BIBLIOGRAPHY

Anonym, 2005,“ *Hull Life Cycle Manager* “, www.dnvsoftware.com, Visited at 24 Agustus 2005.

Anonym, 2005,“ *Services for Managing Risk*“, www.dnvsoftware.com, Visited at 24 Agustus 2005.

Halvorson M, 2002, “ *Microsoft Visual Basic 6.0 Profesional Step By Step* ”, Microsoft Press, USA.

Harpiandi, 2004, “ *Pemrograman Database dengan ADO menggunakan Visual Basic 6.0* “, PT. Media Elex Komputindo, Jakarta.

Holzner S, 1998, “ *Visual Basic 6 Black Book* “, The Coriolis Group, London.

Imam W, 2005, “ *SQL Server 2000* “, PT. Graha Ilmu, Yogyakarta.

Keyserling W, 2000, “ *Failure Modes And Effects Analysis* “, The University of Michigan, Michigan.

Levitt J, 1996, “ *Managing Factory Maintenance* “, Industrial Press Inc., New York.

MADCOMS, 2003, “ *Database Visual Basic 6.0 dengan SQL* “, PT. Andi, Yogyakarta.

Pramana E, 2000, “ *Pedoman Basis Data* ”, Sekolah Tinggi Teknik Surabaya, Surabaya.

Pramana E, 2000, “ *Rekayasa Perangkat Lunak* ”, Sekolah Tinggi Teknik Surabaya, Surabaya.

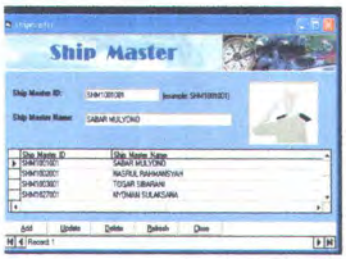
Santoso H, 2004, “ *Pemrograman Client – Server menggunakan SQL Server 2000 dan Visual Basic 6.0* “, PT. Media Elex Komputindo, Jakarta.

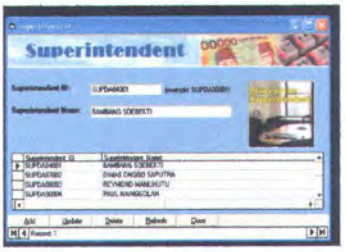
Sasongko B, 1996, “ *Monitoring Perawatan dan Perbaikan Kapal* ”, PT. Bina Buanatama, Surabaya.

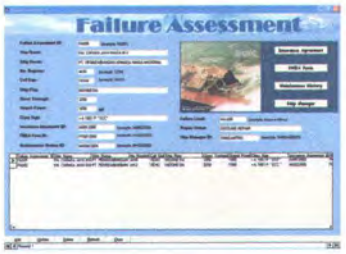
APPENDIX

USER INTERFACE FOR HULL CORRECTIVE MAINTENANCE MODULE

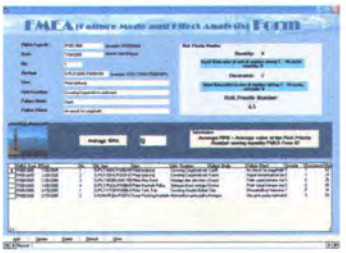
USER INTERFACE FOR HULL CORRECTIVE MAINTENANCE MODULE

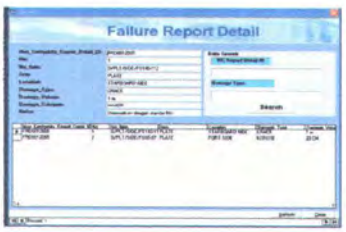


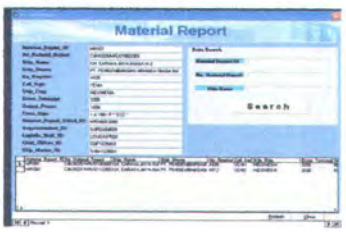




USER INTERFACE FOR HULL CORRECTIVE MAINTENANCE MODULE







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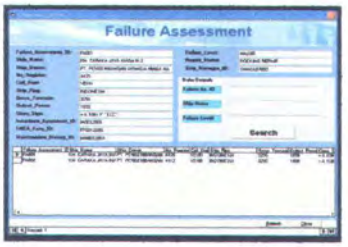

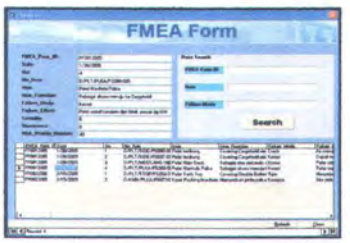

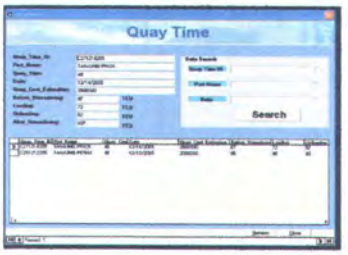

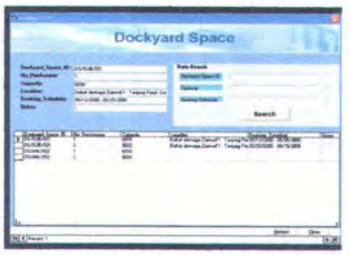

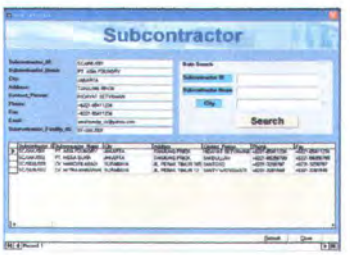

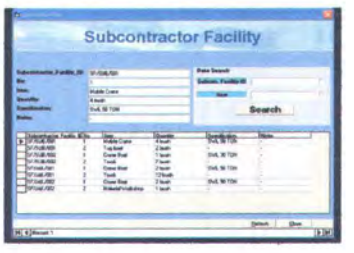

CONTAINER VESSEI 115 TEUS - Built 1990

in 000 Rp

ACTI CODE	ITEM	Budget Jan-Dec'04	Actual Jan-Aug'04	Outlook 2004						Act/Est+Out Jan-Dec'04	Variance to budget	
				Aug	Sep	Oct	Nov	Dec	Ttl-Outlook		Total	%
0	INSURANCE											
010	P & I Advance Call	117,929	60,070		7,786	7,786	8,564	8,564	32,700	92,770	(25,159)	-21%
011	P & I Provision for Supp. Call	-			-	-	-	-	-	-	-	#DIV/0!
02	Hull & Machinery (incl.War Risk)	256,038	160,710		24,241	24,241	24,241	24,241	96,964	257,674	1,636	1%
	Total INSURANCE	373,967	220,780	-	32,027	32,027	32,805	32,805	129,664	350,444	(23,523)	-6%
1	TECHNICAL											
10	Certification & Surveys	43,600	11,420		13,600				13,600	25,020	(18,580)	-43%
11	Docking	-							-	-	-	#DIV/0!
12	Maintenance	271,750	21,080		20,000	27,200	31,450	39,600	118,250	139,330	(132,420)	-49%
13	Work for Government Rule	-	12,950			1,500			1,500	14,450	14,450	#DIV/0!
14	Repair		101,090						-	101,090	101,090	#DIV/0!
15	Work for Renewal	-							-	-	-	#DIV/0!
16	Conversion & Modification	-							-	-	-	#DIV/0!
	Total TECHNICAL	315,350	146,540	-	33,600	28,700	31,450	39,600	133,350	279,890	(35,460)	-11%
2	SUPPLY & PURCHASE											
21	Supplies for Docking	-			-		-	-	-	-	-	#DIV/0!
22	Spare Part	370,584	169,900		34,854	112,864	16,743	55,042	219,303	389,203	18,619	5%
23	Supplies for Government Rule	13,100	7,610			1,000			1,000	8,610	(4,490)	-34%
24	Supplies for Repair	-	6,210		-	-	-	-	-	6,210	6,210	#DIV/0!
25	Supplies for Renewal	-			-	-	-	-	-	-	-	#DIV/0!
26	Supplies for Cvonv./Modi.	-			-	-	-	-	-	-	-	#DIV/0!
290	Running Store	220,002	194,750		10,050	17,350	17,350	17,350	62,100	256,850	36,848	17%
291	Lube Oil	300,375	179,900		25,650	25,650	25,650	25,650	102,600	282,500	(17,875)	-6%
	Total SUPPLY & PURCHASE	904,061	558,370	-	70,554	156,864	59,743	98,042	385,003	943,373	39,312	4%
3	MARINE PERSONEL											
30	Crew Wages	510,652	269,710		37,830	37,830	75,660	45,753	197,073	466,783	(43,869)	-9%
31	Crew Expenses (On Board)	191,687	118,870		17,187	17,187	17,187	17,187	68,748	187,618	(4,069)	-2%
32	Administration	12,000	3,850		1,100	1,100	1,100	1,100	4,400	8,250	(3,750)	-31%
33	Comunication	12,000	2,070		1,100	1,100	1,100	1,100	4,400	6,470	(5,530)	-46%
34	Crew Expenses (Ashore)	37,230	4,100		2,987	2,987	2,987	2,987	11,948	16,048	(21,182)	-57%
	Total MARINE PERSONEL	783,569	398,600	-	60,204	60,204	98,034	68,127	286,569	685,169	(78,400)	-10%
A	Total	2,356,947	1,324,290	-	196,385	277,595	222,032	238,574	934,586	2,258,876	(98,071)	-4%
B	Total Excl.Docking & Conv/Modi	2,356,947	1,324,290	-	196,385	277,595	222,032	238,574	934,586	2,258,876	(98,071)	-4%
C	Amortized Docking Cost	624,000	496,870		62,110	62,110	62,110	62,110	248,440	745,310	121,310	19%
D	Amortized Conv/Modi Cost	186,000					-	-	-	-	(186,000)	-100%
E	Management Fee	98,032	66,000		8,550	8,550	8,550	8,550	34,200	100,200	2,168	2%
F	Interest	-		-	-	-	-	-		-	-	#DIV/0!
G	Depreciation	-		-	-	-	-	-		-	-	#DIV/0!
H	Bareboat charter Rate	-		-	-	-	-	-		-	-	#DIV/0!
		-		-	-	-	-	-		-	-	#DIV/0!
I	Total Cost (Run+Cap)	3,264,979	1,887,160	-	267,045	348,255	292,692	309,234	1,217,226	3,104,386	(160,593)	-5%
J	Tot Daily Cost (Run+Cap)	8,945	7,734	-	8,902	11,234	9,756	9,975	9,977	8,505	(440)	-5%

Jadwal Docking Kapal-Kapal PT. Pelayaran Mas[illegible]

Tahun 2005 - 2007 (sementara)

No.	Nama Kapal	Masa Klas	Klas Expire	Masa Cabut Poros	Cabut Poros Terakhir	Cabut Poros YAD	Docking Terakhir	[illegible] YAD	[illegible]	Catatan
1	Magnolia Star	5 tahun	Mar. 2008	5 tahun	Juni 2000	Juni 2005	Pebr. 2003	Agts. 2005	[illegible]	Survey Antara & Cabut Poros Propeller
2	[illegible]	5 tahun	[illegible]	[illegible]	Sept. 2000	Sept. [illegible]	[illegible]	[illegible]	[illegible]	[illegible] & Cabut Poros Propeller
3	Mataram Express	5 tahun	Agts. 2008	5 tahun	Mar. 2003	Mar. 2008	Mar. [illegible]	Sept. 2005	[illegible]	[illegible] Antara & Cabut Poros Propeller
4	Caraka JN III-17	5 tahun	[illegible]	[illegible]	Juni 2003	Juni [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Caraka JN III-2	5 tahun	Sept. 2008	5 tahun	Juli 2003	Juli 2008	Juli [illegible]	Juli [illegible]	[illegible]	[illegible] Antara
6	Melita	5 tahun	Okt. 2006	5 tahun	Nop. 2000	Nop. 2005	Ags. [illegible]	Pebr. [illegible]	[illegible]	[illegible] Pembaharuan Klas & Cabut Poros Propeller
7	Caraka JN III-8	5 tahun	Juli 2006	5 tahun	Jan. 2001	Jan. 2006	Sept. [illegible]	[illegible]	[illegible]	[illegible] Pembaharuan Klas & Cabut Poros Propeller
8	Mitra Ocean	5 tahun	Sept. 2008	5 tahun	Sept. 2003	Sept. 2008	Sept. [illegible]	[illegible]	[illegible]	Survey Antara
9	Caraka JN III-28	5 tahun	Okt. 2008	5 tahun	Okt. 2003	Okt. 2008	Okt. [illegible]	Apr. [illegible]	[illegible]	[illegible] Antara
10	Multi Guna	5 tahun	Mar. 2009	5 tahun	Nop. 2003	Nop. 2008	Nop. [illegible]	Mei [illegible]	[illegible]	[illegible] Survey Antara
11	Mahakam River	5 tahun	Mar. 2008	5 tahun	Juni 2001	Juni [illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible] & Cabut Poros Propeller
12	Multi Sarana	5 tahun	Des. 2008	5 tahun	Jan. [illegible]	Jan. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	Manise	5 tahun	Pebr. 2009	5 tahun	Jan. 2004	Jan. [illegible]	[illegible]	[illegible]	[illegible]	Survey Antara
14	Mayapada	5 tahun	Apr. 2008	5 tahun	Juni 2001	Juni [illegible]	Jan. [illegible]	Juni 2006	+6	Survey Antara & Cabut Poros Propeller
15	Mentaya River	5 tahun	Juli 2006	5 tahun	Juli 2001	Juli [illegible]	Pebr. [illegible]	Agts. 2006	+6	Pembaharuan Klas & Cabut Poros Propeller
16	Meratus Express	5 tahun	Mar. 2010	3 tahun	Pebr. 2004	Pebr. 2007	Pebr. 2004	Agts. 2006	+6	Cabut Poros Propeller
17	Multi Express	5 tahun	Sept. 2009	5 tahun	Juni 2002	Juni 2007	Mei 2004	Nop. 2006	+6	Survey Antara & Cabut Poros Propeller
18	Martapura River	5 tahun	Agts. 2006	5 tahun	Juli 2001	Juli 2006	Mei 2004	Nop. 2006	+6	Pembaharuan Klas & Cabut Poros Propeller
19	Southern Express	5 tahun	Juni 2009	5 tahun	Juni 2004	Juni 2009	Juni 2004	Des. 2006	+6	Docking Survey
20	Musi River	5 tahun	Juli 2008	5 tahun	Sept. 2001	Sept. 2006	Juli 2004	Jan. 2007	+6	Survey Antara & Cabut Poros Propeller
21	Marina Mas	5 tahun	Apr. 2007	5 tahun	Apr. 2002	Apr. 2007	Sept. 2004	Mar. 2007	+6	Pembaharuan Klas & Cabut Poros Propeller
22	Caraka JN III-24	5 tahun	Mar. 2008	5 tahun	Mar. 2002	Mar. 2007	Nop. 2004	Mei 2007	+6	Cicilan Pembaharuan Klas & Cabut Poros Propeller
23	Maharani	5 tahun	Okt. 2007	5 tahun	Nop. 2004	Nop. 2009	Nop. 2004	Mei 2007	+6	Docking Survey
24	Multi Spirit	5 tahun	Des. 2009	5 tahun	Des. 2004	Des 2009	Des. 2004	Juni 2007	+6	Survey Antara
25	Memiri	5 tahun	Agts. 2007	4 tahun	Juli 2002	Juli 2006	Jan. 2005	Juli 2007	+6	Pembaharuan Klas & Cabut Poros Propeller
26	Multi Star	5 tahun	Pebr. 2006(8)	5 tahun	Juni 2003	Juni 2008	Pebr. 2005	Agts. [illegible]	[illegible]	[illegible] Antara
27	Mandiri Abadi	5 tahun	Juni 2007	5 tahun	Apr. 2005	Apr. 2010	Apr. 2005	Okt. [illegible]	[illegible]	[illegible] Survey
28	Merlin	5 tahun	Pebr. 2006	4 tahun	Mei 2005	Mei 2009	Mei 2005	Nop. 2007	[illegible]	Docking Survey
29	Melia Express	5 tahun	Sept. 2008	5 tahun	Juni 2005	Juni 2010	Juni 2005	Des. 2007	[illegible]	Docking Survey

DAFTAR PERBAIKAN DAN PENGEDOKAN KM. CARAKA JAYA III - 2

PEMILIK : PT. PEL. MERATUS
UKURAN UTAMA
LOA : 98,00 M
LPP : 92,15 M
B : 16,52 M
D : 5,38 M
GRT : 3.256 Ton

Klasifikasi : BKI
Jenis Survey : SS
Order : K. 03055
Pimpro : Budiadi Yani
Wasdal : Heru PD
S E : Tarkim
O S : Sukatno
Wasdal Pimpro : Tondiaji

in = 09/07/03
out = 11/07/03 (8
→ 2 setelah dam
pintsan volume
material belu

FOR REVIEW
Dated : 2003 JUL 01

NO URT	URAIAN PEKERJAAN	VOLUME
2.	3.	4.
I.	KAPAL SECARA UMUM	
A.	PENGEDOKAN	
01	Pemasangan & pengaturan balok lunas/samping ✓	8 ~~12~~ hari dock
02	Asistensi naik turun dok. ✓	
03	Bantuan kapal tunda untuk naik turun dok ✓ F 1,2 / A 3,2 OK	
B.	PELAYANAN UMUM	
03	Diberikan tempat dan tenaga untuk pembuangan sampah.	5 m3 → kapal
04	Sambungan darat untuk aliran listrik, 3 phase	1 kali
07	Supply aliran listrik selama kapal diatas Dok, 380 V / ~~30A~~ ~~250A~~ (dua puluh lima) A	8 ~~12~~ hari
08	Supply air tawar	50 ton
12	Penjaga kebakaran / peralatan untuk pemadam kebakaran , 1 orang (selama kapal di atas dok)	8 ~~12~~ hari
13	Fasilitas MCK selama pengedokan	8 ~~12~~ hari
14	Fasilitas tambat (termasuk bantuan tali temali).	3 hari
D	LAIN-LAIN	
08	Gambar bukaan kulit . (sebagai laporan ultrasonic test) → dibuatkan	lbr
I	KONSTRUKSI BADAN KAPAL	

NO URT	URAIAN PEKERJAAN	VOLUME
2.	3.	4.
A.	**PEMBERSIHAN DAN PENGECATAN**	
	(bahan cat dan thiner dari owner)	
01	Badan kapal dibawah garis air (keel~DLL)	1.910 m2
	a. Secrap ~~HD~~ cuci	
	b. Waterjet → Spot 2 sweep blast.	
	c. Cuci air tawar sebelum pengecatan	
	d. Pengecatan, 2 x AC dan ~~2~~ x AF → A → tanya IP.	
04	Tanda lambung timbul/tanda sarat dicat.	1 set C
	→ Tanda plimsol yang lama dibuang.	
15	Bak rantai jangkar	2 buah L
	a. Pembersihan	
	b. Diperiksakan	
	c. Pembersihan lumpur	
	d. Pengecatan (cat ex owner) → bitumics.	
B.	**PELINDUNG MATERIAL**	
02	Pemasangan & penggantian anode.	
	(Anode owner suppiy)	
	~~8~~ Kg 11 kgs } Pelindung Zinc anode.	24 ~~pc~~
	~~4~~ kg 7 kg }	~~48~~ buah
		~~6~~ buah
		23 ~~pc~~
C.	**SUMBAT LUNAS & ALMARI LAMBUNG**	
01	Buka, pasang dan semen sumbat dasar tanki	10 ~~pc~~
		~~11~~ buah
02	Buka, bersihkan, periksa, pasang kembali dan - dicat almari lambung (cat 2 x AC dan 1 x AF)	4 buah
04	Buka, bersihkan, sekur, pelihara berkala, periksa dan pasang kembali katup-katup hisap dan katup buang.	
	a. Katup hisap dan katup buang(Globe Valve).	
	dia.9"	3 buah
	dia.7"	3 buah
	dia.5"	1 buah
	dia.4"	1 buah
	dia.3"	2 buah
	dia.2"	8 buah
D	**PEKERJAAN LAMBUNG SECARA UMUM**	

NO URT	URAIAN PEKERJAAN	VOLUME
2.	3.	4.
05	Ultrasonic test → b.g.a → main deck. - DD. 80 titik → bhd. web. frame - FR. 100.	
E	PENGGANTIAN PLATE & PEMBUATAN KONSTRUKSI	
01	Lambung kn / kr → lambung 10" bottom 12"	5.000 kg
02	Dasar Ganda / Keel	2.000 kg
03	Tank top → 12"	3.000 kg
	Catatan: - Diluar penghalang dan perluasan pekerjaan yang diakibatkan. - Replating didaerah linggi buritan dan haluan akan diperhitungkan tersendiri. - Belum termasuk blasting & shopprimer	
III.	PERLENGKAPAN KAPAL	
A.	LUBANG DAN AMBANG PALKAH	
01	Buka/pasang tutup deksel (termasuk ganti packing) diluar penggantian mur baut	x10 buah
IV.	PERALATAN UNTUK KAPAL	
A.	PERLENGKAPAN MANUVER KAPAL	
01	Diadakan pengukuran kelonggaran poros kemudi dan dibuatkan laporan	1 unit
02	Bila tidak memenuhi syarat, poros & daun - kemudi dicabut ditempat untuk pemeriksaan.	1 unit
03	Poros dan daun kemudi dibawa kebengkel untuk perbaikan : - Poros dinaikan bangku bubut diperiksa kelurusan nya - Dudukan bantalan dan permukaan flends dibubut - Poros dan daun kemudi dirakit dan dinaikan meja kerja guna diperiksa kelurusannya, kemudian di - pasang kembali dikapal (diluar penggantian dan perbaikan lainnya),	1 buah

NO URT	URAIAN PEKERJAAN	VOLUME
2.	3.	4.
04	Daun kemudi dibersihkan dan dicat kemudian di pasang zing anodes 4 bh. (zing anodes dari pemilik) 2x AC & 2x AF 6 pt	1 buah
05	Gland packing poros kemudi diganti baru (bahan ex owner)	1 set
D.	JANGKAR, PERALATAN TARIK DAN TAMBAT	
01	Jangkar beserta rantainya kanan kiri diturunkan diurai, dibersihkan, diwaterjet, diukur, dibuatkan laporan, diberi tanda dan dicat. → cat bitumen	2 set
V	PERALATAN ABK DAN PENUMPANG	
VI C	KOMPONEN UTAMA DARI PERMESINAN BALING - BALING DENGAN TRANSMISINYA	
01	Buka pasang skerm/pelindung poros baling baling	1 unit
02	Ukur kelonggaran poros baling baling dan dibuatkan laporan.	1 unit
03	Bila hasil pengukuran tidak memenuhi syarat, poros baling-baling dengan baling balingnya dicabut ditempat untuk pemeriksaan.	1 unit
04	Poros baling baling dan baling baling dibawa - kebengkel untuk perbaikan / perawatan - Periksa kelurusan diatas bangku bubut. - Bubut Sleve/ dudukan bantalan. - Diadakan Contacfiit konis daun baling baling dan flens kopling. - Srempet/ bubut permukaan flends kopling.	1 unit
06	Baling baling dibersihkan dan dipolish. → rekondisi + balancing Reimers.	1 buah
07	Reimes packing ganti baru (bahan ex owner)	1 buah
08	Poros baling-baling pada dudukan spy magnaflug	1 buah

NO URT	URAIAN PEKERJAAN	VOLUME
2.	3.	4.
VII A 01	**SISTIM KOMPONEN UTAMA DARI PERMESINAN** **SISTIM MINYAK BAHAN BAKAR.** Pipa dikamar mesin yang tidak memenuhi syarat diganti baru (diluar bending dan fitting) sch.40 weldid, dia. 3"	12 meter

No. Form : Per/F71-003/Rev.0

Surabaya, 10 Juli 2003
PT. DOK DAN PERKAPALAN SURABAYA
(PERSERO)

Bambang Subekti, ST
Ka. Biro Rendal

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
01.	Fore castle Fair lead	. Fairlead haluan jumlah 6buah buka, bersihkan, check kondisi as dan bushnya. selanjutnya digemukin dan rakit kembali.	dia.280mm	6 buah
02.	Pijakan melihat jangkar	Pijakan melihat jangkar tipis dan keropos agar di ganti dengan plat baru.	Plat kembang/ Borders uk. 800X800X5 mm	2 buah
		Pijakan operator windlass dirawat, ganti plat baru.	Borders uk. 390x1200x5mm	2 buah
03.	Kanvas rem windlass	Kanvas rem windlass sudah aus dan tipis agar diganti dengan yang baru.	2400x100x10mm Mur baut kuningan.	2 set
04.	Pipa hidrolik	Pipa hidrolik windlass sudah keropos agar diganti pipa baru sesuai aslinya.	Pipa 2" Flens elbow	1 btg 2 buah 4 buah
05.	Kotak mic	Kotak mic publik adresser haluan rusak, agar dibuatkan baru.	400x200x230mm	1 buah
06.	Forecastle deck	Forecastle deck yang berkarat diketok, sikat, meni dan cat deck green 2x luas +/- 80M2	Meni Cat hijau Thinner	20 Lt 20 Lt 05 Lt
07.	Bulwark	Bulwark haluan yang berkarat diketok, sikat, meni dan cat abu-abu 2x Luas +/- 30 M2	Meni Cat abu-abu	05 Lt 10 Lt
08.	Man hole bosunstore	Man hole dirawat, engsel yang rusak dirawat, mur baut kupu-kupu yang rusak diganti, ganti paking baru.	Plat strip 35mm x 3mm	1 Bt

Dibuat tanggal 07 / 04 / 2005	Disetujui tanggal 11 / 09 / 2005	Diterima tanggal 7 / 11 / 05
Tanda Tangan :	Tanda Tangan :	Tanda Tangan :
Nama :	Nama : Addies	Nama :
Jabatan :	Jabatan : Nakhoda	Jabatan : Technical Surveyor

Km. Caraka Jaya Niaga III-2 PELAYARAN MERATUS

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
09.	Pintu kedap air.	Pintu kedap air bosunstore 2 bh, handle yang macet di lancarkan, digrease baru. Karet yang rusak/mati ganti karet paking baru.	Karet paking	
10.	Alur rantai jangkar	Alur rantai jangkar dari ulup menuju bak rantai aus agar didoubling plat baru.	Plat besi Kawat las.	
11.	Swivel & rantai jangkar	Swivel jangkar kanan kiri yang tipis agar ditambal las bagian dalam.	Kawat las.	
		Rantai jangkar yang ukuran dibawah standard ganti baru sesuai persetujuan SM dan petunjuk klass	Rantai Jangkar.	
12.	Main deck. Bracket.	Bracket bulwark kanan kiri sudah tipis bagian bawah, agar dipotong bagian tipis dan dilas sambung plat baru seperti aslinya.	Plat bentuk bracket bulwark.	29 bh
13.	Bracket hatchcoaming.	Bracket hatchcoaming bagian bawah tipis & berkarat agar dipotong dan dilas sambung platbaru.	Plat dibentuk bracket	33bh
14.	Plat bulwark	Plat bulwark bagian bawah sudah tipis dipotong dan disambung plat baru. Sambungan bulwark dilas.	Plat strip Kawat las	8 btg

Dibuat tanggal / /	Disetujui tanggal / /	Diterima tanggal : 2/6/2005
Tanda Tangan :	Tanda Tangan :	Tanda Tangan :
Nama : WAHYUDI	Nama : LIANTORIES	Nama :
Jabatan : MUALIM I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
15.	Bulwark	Bulwark dan hatchcoaming yang berkarat diketok, sikat, meni dan cat abu-abu 2 X.	Meni Cat abu-abu Thinner	60 Lt 80 Lt 20 Lt
16.	Ponton	Ponton palka 1,2,&3 alur got air hujan berkarat dan keropos diganti plat baru	Plat strip	
		Packing karet yang rusak ganti packing baru.	Packing karet	
		Ponton yang sudah direpair diketok, meni, cat abu-abu 2x .	Meni cat abu-abu Thinner	60 Lt 80 Lt 20 Lt
17.	Blower	Blower palka 1,2,3 dilancarkan kran buka tutup dan direpair yang rusak. dibuatkan sistem buka tutup blower/klep buka tutup.	Plat 3mm	2 lb
18.	Man hole	Tutup man hole palka 1,2,3 sebanyak 6 bh dirawat, di gemukin dan karet paking yang rusak diganti	Plat srip 35mmx3mm karet uk.35mm x 20mm.	5 btg 20 Mtr
19.	Main deck	Main deck palka 1,2,3 luas +/- 300 M2 diketok, sikat, meni dan dicat merah dek.	Meni Cat merah thinner	80 lt 80 Lt 20 lt
20.	Buritan. Fairlead.	Fair lead buritan 6bh dibuka, dilancarkan dan dirakit kembali. ganti mur baut yang rusak. tutup fair lead 4 buah rusak diganti baru.	dia.280 mm	06 bh

Dibuat tanggal : / /	Disetujui tanggal : / /	Diterima tanggal : 2/6/09
Tanda Tangan	Tanda Tangan	Tanda Tangan
Nama : WAHYUDI	Nama : L. ANDRIES	Nama :
Jabatan : MUALIM I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

Perusahaan Pelayaran Nusantara ... Km Caraka Jaya Niaga ...

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
21.	Manhole buritan	Manhole gudang kering uk. 880mmx880mm alur paking karet keropos pada tepinya agar didobling plat tebal 3mm.	Plat strip 35mmx3mm Karetukuran 35mmx20mm	2btg 3 M
22.	Kanvas mooringwinch.	Kanvas rem mooring winch sudah tipis dan aus uk.90mmx250mmx8mm.	Kanvas rem Mur baut.	2 set
23.	Tangga Acc	Tangga gangway accomodasi kanan kiri bahan besi di-ketok,meni,dan cat perak.	Meni Cat perak thinner	5 lt 5 lt 2 lt
24.	Poop deck	Poop deck luas+/- 200M2 diketok,sikat,meni dan di cat dek green 2x.	Meni Cat hijau Thinner	40 lt 40 lt 10 lt
25.	Railing.	Railing buritan panjang +/- 80M bagian yang berkarat diketok,meni dan dicat putih dan hitam bag.atas	Meni Cat putih Cat hitam Thinner	05 lt 20 lt 10 lt 05 lt
26.	Dinding	Dinding dari anjunga n sampai buritan ketok bagian berkarat,meni dan dicat putih.	Meni Cat putih	10 lt 40 lt
27.	Sekoci	Perlengkapan sekoci kanan kiri dicek dan yang kurang /rusak diganti.		
28.	cat sekoci	Sekoci dicuci dengan sabun dan dicat dengan cat orange. dipasang reflectfe tip baru	Cat Orange Reflectif tip	20 lt 1roll

Dibuat tanggal : / /	Disetujui tanggal : / /	Diterima tanggal : 2 / 6 / 03
Tanda Tangan :	Tanda Tangan :	Tanda Tangan :
Nama : WAHYUDI EKO.P	Nama :	Nama :
Jabatan : MUALIM I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

PT. PELAYARAN MERATUS

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
29.	Blok pengan tar wire sekoci.	Blok penganta wire sekoci dilancarkan d n diberi gemuk baru te masuk wire dan labrang sekoci.	Grease	1Pail
30.	Dewi-dewi	Dewi-dewi sekoci termasuk railingnya diketok,sikat, meni,cat putih.	Meni Cat putih Thinner	5 lt 20 lt 5 lt
31.	Deck sekoci	Deck sekoci luas +/-190M2 diketok,sikat,meni dan cat hijau deck.	Meni Cat Hijau Thinner	30 lt 40 lt 10 lt
32.	Anjungan . Rumah/atap pelindung dek.	Samping kanan kiri anjungan dibuatkan atap pelindung dek anjungan dari bahan tulang pipa& atap fiber.	Pipa 1,5" fiber/atap 900mmx2400mm	10 btg 20 lbr
33.	Compass deck	Compass deck,bridge deck, captaintdeck diketok,si-kat,meni,cat hijau deck.	Meni Cat hijau	30 lt 50 lt
34.	Railing	Railing dari compass deck sampai captain deck dira-wat dan dicat putih.	Meni Cat putih Thinner	5 lt 10 lt 5 lt
35.	Blower	Blower kamar mesin posisi di capt.deck 2bh penutup bagian dalam sudah keropos agar diganti baru dan gan-ti paking karetnya.	Plat t.3mm Karet 3mmx2mm	1 lbr 10 Mtr

Dibuat tanggal / /	Disetujui tanggal / /	Diterima tanggal 2 / 6 / 03
Tanda Tangan	Tanda Tangan	Tanda Tangan
Nama WAHYUDI Eko. P	Nama Ali Andries	Nama
Jabatan MUALIM I	Jabatan Nakhoda	Jabatan : Technical Surveyor

Perusahaan Pelayaran ... Km Caraka Jaya Niaga III-2

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
36.	Palkah Plat Topside.	Plat topside lambung kiri penyok sepanjang frame 103-110 agar di replating.	Plat tebal 12mm	
37.	Braket	Braket gading-gading di lower hold sebagian tipis & berkarat agar diganti baru.	Plat dibentuk braket.	
38.	Plat tank Top	Plat tank top yang sudah tipis dan berkarat agar diganti plat baru.	Plat tebal 12mm	
39.	Plat tween deck.	Plat tween deck yang berkarat diketok, sikat, meni dan di cat merah 2X.	Meni Cat merah dek Thinner	80 lt 80 lt 40 lt
40.	Dinding Palka	Dinding palka dicuci/cleaning - seluruh palka dan dicat abu-abu dan perak	Meni Cat abu-abu. Cat Perak	100 lt 40 lt
41.	Pelindung kabel	Pelindung kabel bahan dari plat yang rusak buat baru.		
42.	Kotak sepatu container.	Kotak tempat sepatu container untuk dalam palka dibuatkan baru(3 bh)	Plat siku2 papan	
43.	Saringan air got.	Saringan pipa hisap got palka 1,2,3 kiri kanan yang rusak dibuatkan baru.	Plat bentuk saringan.	
44.	Pelindung smoke detector.	Plat pelindung smoke detector33 bh rusak agar dibuat kan baru, untuk palka1,2,3.	Plat 3mm	8 Lb
45.				

Dibuat tanggal : / /	Disetujui tanggal : / /	Diterima tanggal : 2 / 6 / 2003
Tanda Tangan :	Tanda Tangan :	Tanda Tangan :
Nama : Wahyudi	Nama : L. Fabries	Nama :
Jabatan : Mualim I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

Perusahaan Pelayaran Nusantara Km Caraka Jaya Niaga

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2

Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
45.	Bracket	Bracket frame sebagian sudah tipis dan keropos agar dipotong bagian yang tipis dan ganti baru.	Plat bentuk bracket.	
46.	Sekat palka	Plat sekat palka 1dan 2,2dan3, palka 3dan kamar mesin bagian bawah keropos dan tipis agar dipotong dan dilas plat baru.		
47.	Tanki-tanki	semua tanki balast dan air tawar dibuka,paking manhole diganti baru. semua tanki diclening,cek kondisinya.	Paking manhole tanki	
48.	Pipa sonding.	pipa sounding balast dan air tawar di periksa, yang keropos ganti baru.plat bagian soundingan diperiksa .	Pipa 1.5"	
49.	Got palka	Got palka 1,2,3 dikeringkan, dicleaning,diketok dan dicat bituminus.		
50.	Crane	Crane 1,2 merk Lieberr bagian dinding dan batang pemuat diketok,meni,dan cat hijau 2x	Meni cat hijau Thinner	20 lt 80 lt 20 lt
51.	Cargo blok	Cargo blok crane 1 dan 2 dibuka, bersihkan, pompa gemuk baru dan rakit kembali. cek kondisi sheave dan bearing serta as nya.		
52.	Wire rope.	Wire rope crane 1,2 jenis non rotating wire dicheck ulang kondisi dan dimintakan spare.	Spare wire crane1 : Ø32mm X 207 M Crane 2 : Ø25mm X 174 M	

Dibuat tanggal : / /	Diperiksa tanggal : / /	Diterima tanggal : 2 / 6 / 0
Tanda Tangan :	Tanda Tangan :	Tanda Tangan :
Nama : WAHYUDI	Nama : L. ANDRIES	Nama :
Jabatan : MUALIM I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

Perusahaan Pelayaran Nasional PELAYARAN MERATUS Km Caraka Jaya Niaga

DAFTAR PERBAIKAN (*REPAIR LIST*)

Nama Kapal : KM.Caraka Jaya Niaga III-2
Tanggal Rencana Docking : / /

No.	Obyek Perbaikan	Aktivitas/ Uraian Perbaikan yang diperlukan	Kebutuhan Spare Part	
			Spesifikasi	Jumlah
53.	Railing	Railing crane 1,2 yang rusak agar diperbaiki.	Pipa Ø 1,5"	
53.	Kaca crane	Kaca pelindung crane 1,2 yang pecah agar diganti baru.	Kaca mika.	
54.	Radar	Radar merk JRC jangkauan hamya ± 1 NM agar direpair.		
55.	Echo sounder.	Echo sounder merk JRC agar diadakan service.		
56.	Gyro	Compass gyro merk anschutz kiel dan auto pilot rudder com ilot agar diadakan servis		
57.	Compass adjusment	Agar diadakan compass adjusment dan kalibrasi RDF saat sea trial.		
58.	Master clock.	Master clock anjungan rusak penunjukan jamnya agar direpair.		
59.	Plat topside.	Plat topside buritan kiri posisi kamar mesin penyok ke dalam agar diadakan replating.		
60.	Tanda selar	Tanda selar kapal sudah rusak agar dibuatkan baru.		
61.	Dinding akomodasi.	Dinding akomodasi kamar masinis III dan kelasi keropos agar diganti plat baru.		
62.	Plat bosun store.	Plat lambung kiri di bosun store bocor agar diganti plat baru.		

Dibuat tanggal / /	Diketahui tanggal / /	Diterima tanggal 2/6/03
Tanda Tangan	Tanda Tangan	Tanda Tangan
Nama : WAHYU LEO EKO. K	Nama : H. ANDRIES.	Nama : R. Sybrega
Jabatan : MUALIM I	Jabatan : Nakhoda	Jabatan : Technical Surveyor

Perusahaan Pelayaran Niaga Km. Caraka Jaya Niaga

BIRO KLASIFIKASI INDONESIA

LAPORAN SURVEY
Survey Report

No. : 0385 - SB/B1/2003

No. Reg / Reg. No	Nama Kapal / Ship's name	Nama Panggilan / Call sign	Bendera / Flag	Isi kotor / Gross tonage	Daya / Output
4435	KM. CARAKA JAYA NIAGA III-2	YEHH	Indonesia	GT	1 x 1650 HP

Tanda kelas / Class character	* A 00 I P "EQUIPPED FOR CARRIAGE OF CONTAINER"
Tempat & tgl. Survey / Place & date of survey	Surabaya 22 April 2003 s/d 30 April 2003
Pemilik / Owner	PT. PE[illegible] GEMBANGAN ARMADA NIAGA NASIONAL

[ ] Survey penerimaan kelas B/B Admission to class for new building	[ ] Survey pengedokan Docking survey	[ ] Survey bersambung lambung Continuous hull survey
[ ] Survey penerimaan kelas B/L Admission to class for existing ship	[ ] Survey bawah air In-water survey	[ ] Survey bersambung mesin Continuous machinery survey
[ ] Survey pembaharuan kelas Class renewal survey	[X] Penundaan survey pengedokan Postponement for docking survey	[ ] Survey ketel Boiler survey
[ ] Survey antara Intermediate survey	[ ] Survey poros baling-baling Propeller shaft survey	[ ] Survey otomasi Automation survey
[ ] Survey tahunan Annual survey	[ ] Penundaan survey poros baling2 Postponement for propeller shaft survey	[ ] Survey instalasi pendingin Refrigerating installation survey
[ ] Survey perpanjangan kelas Extention for class renewal survey	[X] Survey khusus Penundaan Visa Occasional survey	[ ] Lain-lain : Others

No./ tempat & tgl.visa terakhir : 8, Surabaya No./ place & date of last visa 24 Januari 2003	No. & masa berlaku sertifikat : 114359 s/d Certificate no. & validity September 2003

VISA No.
9

Survey khusus penundaan Visa no. 8 dan penundaan pengedokan, terapung.

Kelas dipertahankan dengan catatan visa No. 8 dan survey pengedokan agar dilaksanakan paling lambat Juli 2003.

Atas permintaan PT. Meratus, telah dilaksanakan survey terhadap kapal tersebut diatas sewaktu terapung di Perairan Pelabuhan Tanjung Perak Surabaya dan dilaporkan sbb:

Penundaan survey pengedokan, Survey Khusus Penundaan Visa, sesuai form F.101-1995

Surabaya, 30 April 2003

KEPALA CABANG UTAMA
Main Branch Manager

Ir. M. Nasrun Djafar

SURVEYOR

Ir. Arif Bijaksana P.N.

Survey Khusus Penundaan Visa Lambung Dan Penundaan Pengedokan

1. Pelat lambung kapal di atas garis air sejauh yang dapat diperiksa keadaan baik, kecuali beberapa bagian kedapatan deformasi, bagian yang deformasi tersebut diperiksa keadaan baik tidak terdapat keretakan dan dilaksanakan uji kedap keadaan baik.

   Rekomendasi
   Pelat lambung beserta gading yang deformasi agar dipotong dan diganti baru paling lambat Juli 2003, yaitu:
   - Pelat antara gd. No. 39 - 42/43 (ki) berbatasan dengan geladak kedua
   - Gading No. 104 (ki) dua lajur diatas geladak kedua.
   - Pelat antara gd. No. 105/106 - 107 (ki) dua lajur diatas geladak kedua.
   - Pelat antara gd. No. 108 - 109 (ki) tiga lajur diatas geladak kedua.

2. Pelat geladak utama, pelat geladak kedua dan pelat alas ganda diperiksa keadaan baik.

3. Pelat sekat kedap melintang diperiksa keadaan baik, kecuali beberapa bagian kedapatan tipis didoubling dan deformasi, pelat-pelat sekat yang kedapatan tipis didoubling dan deformasi diperiksa tidak terdapat keretakan dan diuji kedap hasil baik.

   Rekomendasi
   Pelat sekat kedap melintang yang kedapatan tipis didoubling dan deformasi agar dipotong dan diganti baru paling lambat Juli 2003, yaitu:
   - Pelat sekat antara ruang muat I dan II (pada gd. No. 101) berbatasan dengan geladak kedua (ki/ka)
   - Pelat sekat antara ruang muat II dan III (pada gd. No. 67) berbatasan dengan geladak kedua (ki)
   - Pelat sekat antara ruang muat III dan kamar mesin (pada gd. No. 33) satu lajur diatas geladak kedua (ki)

4. Bagian-bagian konstruksi di dalam Fore castle space, ruang muat I, II dan III, kamar mesin, dan ruang instalasi kemudi diperiksa keadaan baik., kecuali beberapa bracket untuk gading-gading ke tank top pada ruang muat kedapatan tipis.

   Rekomendasi
   Bracket gading-gading ke tank top yang kedapatan tipis pada gd. No. 43 – 46 (ki) dan pada gd. No. 48 – 53 (ki) agar dipotong dan diganti baru paling lambat Juli 2003.

5. Sumur-sumur bilga di ruang muat dan kamar mesin diperiksa secara umum, keadaan baik dan tidak ada tanda-tanda kebocoran.

6. Stuffing box poros baling-baling beserta sistem kekedapannya diperiksa eksternal dari dalam kamar mesin keadaan baik dan tidak terdapat kebocoran yang berlebih.

7. Ambang palka beserta penutupannya diperiksa keadaan baik.

8. Rumah geladak, pintu kedap cuaca, jendela dan engine skylight diperiksa keadaan baik

9. Bulwark (ki/ka) diperiksa keadaan baik.

10. Perlengkapan jangkar (ki/ka) dan peralatan tambat diperiksa visual keadaan terpasang baik di kapal.

11. Log book deck diperiksa dan berdasarkan informasi Nakhoda, kapal tidak pernah mengalami kerusakan yang serius atau tanda-tanda yang membahayakan pada bagian bawah garis air sejak pengedokan terakhir.

REKOMENDASI

Survey Pengedokan agar dilaksanakan paling lambat Juli 2003

CATATAN :

- Survey Alas terakhir 08 Januari 2001

BIRO KLASIFIKASI INDONESIA

LAPORAN
SURVEY
Survey Report

No : 0004-SP/B1/2001

No.Reg Reg.No	Nama Kapal Ship's name	Tanda Panggilan Call sign	Bendera Flag	Tonase kotor Gross Tonnage	Daya Output
4435	CA[illegible]AKA JAYA NIAGA III - 2	Y E H H	Indonesia	3256 GT	1650 HP

Tanda kelas : [illegible]00 I P "EQUIPPED FOR CARRIAGE OF CONTAINER " Class character	Tempat & tgl. survey : Singapore, 03/01/01 -10/01/01 Place & date of survey
Pemilik : PT [illegible]ENGEMBANGAN ARMADA [illegible]NIAGA NASIONAL Owner	Operator : PT. PELNUS MERATUS - SURABAYA

☐ Survey pene[illegible]aan kelas B/B Admiss[illegible]ss for new building	☒ Survey pengedokan Docking survey	☐ Survey bersambung lambung Continuous hull survey
☐ Survey pene[illegible]aan kelas B/L Admission to [illegible]ss for existing ship	☐ Survey bawah air in-water survey	☐ Survey bersambung mesin Continuous machinery survey
☐ Survey pem[illegible]uan kelas Class renewa[illegible]rvey	☐ Penundaan survey pengedokan Postponement for docking survey	☐ Survey ketel Boiler survey
☒ Survey anta[illegible] Intermediate [illegible]vey	☐ Survey poros baling-baling Propeller shaft survey	☐ Survey otomasi Automation survey
☐ Survey tahu[illegible]n Annual surve[illegible]	☐ Penundaan survey poros baling2 Postponement for propeller shaft survey	☐ Survey instalasi pendingin Refrigerating installation survey
☐ Survey perp[illegible]jangan kelas Extention fo[illegible]ss renewal survey	☐ Survey Khusus Occasional survey	☐ Lain-lain : Others

No./ tempat & [illegible]visa terakhir : 4 / Banjarmasin, 07.12.2000 No./ place & d[illegible]ast visa	No.& masa berlaku sertifikat: 114359 & Sept 2003 Certificate no.& validity

VISA No. 5

Docking [illegible]rvey and Intermediate Survey Carried Out .

Visa No [illegible]Carried Out

Class Co[illegible]irmed

At the re[illegible]uest of the owner's, Messrs PT. PELAYARAN NASIONAL MERATUS - SURABAYA the Undersigned Surveyor attended the ship while on dry dock at Singapore Technologies Marine Shipyard - Singapore, and reported accordance to survey report form F-101 and F-104 as follow :

Vessel dock : 03.01.2001

Vessel undock : 08.01.2001

Singapore , 14th January. 2001

KEPALA CABANG
Branch Manager

SURVEYOR

ONDT/SUBAGYO

Docking survey , Intermediate survey and Continuous Machinery Survey were carried out and reported as follows :

I. HULL

1 Shell Plating

Bottom and side plating, stem and stern frames clean, thickness measurement carried out, examined and found to be satisfactory.

Damage parts of side plate cropped off and renewed as follows,

- starboard
  Strake F/G between fr.35/36 - 38/39, size approx.1750 x 1300 x 10 mm.
- stem plate.
  Strake C - F , size approx. 3100 x 1050 x 10 mm.
  Plate E/F , size approx. 900 x 700 x 12 mm
- some welding seam buildup by welding, examined and found to be satisfactory.

2. Deck Plating

Main deck, thickness measurement carried out, examined and found to be satisfactory.

Upper deck, boat deck, fore castle deck , visual inspection and found to be satisfactory.

3. Bulkhead

Transverse bulkhead examined and found to be satisfactory.

4. Tanks

Following tanks opened up, cleaned for internal survey, and hydraulic pressure test carried out found satisfactory

- Fore Peak Tank
- After Peak Tank

5. Sea Chests

Grating removed, chests cleaned, examined and found to be satisfactory steel surface recoated and gratings refitted.

6. Bower Anchor and Chain

- Bower anchor port and starboard side cleaned, examined and found to be satisfactory.
- Swivel port and starboard side cleaned, examined and found to be satisfactory.
- Chain anchor port and starboard side cleaned, examined and found to be satisfactory.

7. Rudder Stock and Rudder Blade

- Rudder Blade cleaned, damaged plate to be cropped off and renewed partly, hydraulic pressure test carried out and examined , and found to be satisfactory.
- Maximum bearing clearances recorded as follow :
  Upper pintle 0,65 mm
  Bottom pintle 2,90 mm

8. Thickness Measurements

Thickness measurements carried out by QA SYSTEMS PTE LTD. In order

BIRO KLASIFIKASI INDONESIA

LAPORAN SURVEY
Survey Report

No. : 0833 - SB/B1/2004

No. Reg Reg. No	Nama Kapal Ship's name	Nama Panggilan Call sign	Bendera Flag	Isi kotor Gross tonage	Daya Output
04435	CARAKA JAYA NIAGA III-2	Y E H H	Indonesia	3256 GT	1 x 1650 HP

Tanda kelas Class character	± A 100 I P "EQUIPPED FOR CARRIAGE OF CONTAINERS"
Tempat & tgl. Survey : Place & date of survey	Surabaya 26 Agustus 2004
Pemilik Owner	PT. PENGEMBANGAN ARMADA NIAGA NASIONAL

☐ Survey penerimaan kelas B/B Admission to class for new building	☐ Survey pengedokan Docking survey	☐ Survey bersambung lambung Continuous hull survey
☐ Survey penerimaan kelas B/L Admission to class for existing ship	☐ Survey bawah air In-water survey	☐ Survey bersambung mesin Continuous machinery survey
☐ Survey pembaruan kelas Class renewal survey	☐ Penundaan survey pengedokan Postponement for docking survey	☐ Survey ketel Boiler survey
☐ Survey antara Intermediate survey	☐ Survey poros baling-baling Propeller shaft survey	☐ Survey otomasi Automation survey
☒ Survey tahunan Annual survey	☐ Penundaan survey poros baling2 Postponement for propeller shaft survey	☐ Survey instalasi pendingin Refrigerating installation survey
☐ Survey perpanjangan kelas Extention for class renewal survey	☒ Survey khusus Pelaksanaan Visa Occasional survey	☐ Lain-lain : Others

No./ tempat & tgl.visa terakhir : No./ place & date of last visa	1, Surabaya 14 Agustus 2003
No. & masa berlaku sertifikat : Certificate no. & validity	004501 s/d September 2008

VISA No.
2

Survey tahunan dan survey khusus pelaksanaan visa lambung, terapung. Visa no. 1 dilaksanakan

Kelas dipertahankan

Atas permintaan PT. Meratus, telah dilaksanakan survey terhadap kapal tersebut diatas sewaktu terapung di Perairan Pelabuhan Tanjung Perak Surabaya dan dilaporkan sbb:

- Survey tahunan, Survey Khusus Pelaksanaan Visa, sesuai form F.101-1995 & F.104-1995

Surabaya, 26 Agustus 2004

KEPALA CABANG UTAMA
Main Branch Manager

Ir. M. Nasrun Djafar

SURVEYOR

Ir. Rahmat Kurniawan

F. 100 - 199